UNITED STATES OF AMERICA:
WAR DEPARTMENT.

MONTHLY WEATHER REVIEW.

(GENERAL WEATHER SERVICE OF THE UNITED STATES.)

APRIL, 1888.

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PREPARED UNDER THE DIRECTION OF
BRIGADIER GENERAL A. W. GREELY,
CHIEF SIGNAL OFFICER OF THE ARMY,

By H. H. C. DUNWOODY,
1st LIEUTENANT, 4th ARTILLERY, A. S. O. AND ASSISTANT.

PUBLISHED BY AUTHORITY OF THE SECRETARY OF WAR.

WASHINGTON CITY:
SIGNAL OFFICE.
1888.

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List of merchant marine steam and sailing vessels from which International Meteorological reports were received at the Office of the Chief Signal Officer, U. S. Army, Washington, D. C., in time to be used in the preparation of the Weather Review for the month of April, 1888.

	Name of vessel.	Captain.
Br.	s. s. Adriatic	Capt. J. G. Cameron.
	Ailsa	T. M. McKnight.
	Alaska	Geo. S. Murray.
	Alamo	S. Risk.
Am.	Aller	H. Christoffers.
Ger.	Alps	J. W. Tobin.
Br.	Alsatia	J. Brown.
	Alvo	D. Williams.
	Ambrose	E. Bisson.
	Amy Dora	J. J. Thompson.
Ger.	America	H. Heineke.
Am.	Andes	J. Evans.
Br.	Anchoria	W. Brown.
	Aquan	J. C. Adair.
	Arizona	S. Brooke.
	Arabic	W. M. Smith.
	Aurania	W. H. P. Hains.
Ger.	Australia	G. Franck.
Br.	Australia	A. McRitchie.
	Ayrshire	D. Jenkins
Nor.	Balder	F. Mohn.
Br.	Baltimore	J. Trenery.
	Baltic	E. Smith.
	Barracouta	Robert Hubbard.
	Barrowmore	John Inch.
	Baumwall	C. W. Rehse.
	Bengore Head	J. R. Brady.
Belg.	Belgenland	W. A. Beynon.
Br.	Bessarabic	J. Martin.
	Black Prince	J. Milburn.
Ger.	Bohemia	R. Kordell.
Br.	Borderer	F. Manley.
	Bothnia	Thomas Dutton.
Ger.	Braunschweig	Bödeker.
Br.	Britannic	H. Parsell.
	British Prince	John Milburn.
	British Princess	E. H. Freeth.
	British Queen	R. Wills.
	Brookiyn City	W. Fitt.
	Bulgarian	E. Parry.
	Buffalo	J. H. Malet.
Fr.	Burgundia	F. Dulac.
Br.	Canada	J. Robinson.
	Carroll	G. H. Brown.
Span.	Carolina	S. Arribi.
Br.	California	R. T. Garvie.
	Caribbean	H. Daniel.
	Carthaginian	A. McNicol.
	Catalonia	Edward Wylie.
	Celtic	P. J. Irving.
	Cervin	Sinclair Hughson
	Chicago	J. W. Jones.
Fr.	Chateau Lafite	Ollivier.
Br.	Chester	S. Wohlmuth.
	Circassia	A. Campbell.
Am.	City of Augusta	J. W. Catherine.
Br.	City of Berlin	F. S. Land.
	City of Chester	A. Lewis.
Am.	City of Chester	J. Wallace.
	City of Dallas	C. W. Read.
	City of Para	L. Dexter
Br.	City of Richmond	A. Redford.
	City of Rome	H. Young.
Am.	City of San Antonio	J. Wilder.
	City of Washington	J. W. Reynolds.
Ger.	Colima	R. C. Jennings.
Am.	Colon	F. Henderson.
	Colorado	J. E. Jenkins.
Br.	Counsellor	W. Lang.
	Concordia	A. McLean.
	Croma	W. P. Lord.
	Cyprus	E. Guild.
	Damara	Geo. Dixon.
	Denmark	R. S. Rigby.
Belg.	DeRuyter	J. J. Braeens.
Br.	Discoverer	John Hughes.
Ger.	Donau	W. Taper.
Br.	Dorian	J. McKeague.
	Durham City	D. D. Galbraith.
	Earnmoor	R. Grey.
	Edith Godden	J. H. Bennett.
Dtch.	Edam	H. C. v. d. Zee.
Br.	Egypt	J. Sumner.
	Egyptain Monarch	John Harrison
Ger.	Elder	H. Baur.
	Elbe	G. Meyer.
Span.	Elcano	V. de Ispizua.
Am.	El Paso	H. S. Quick.
Ger.	Ems	Th. Jüngst.
Br.	England	A. F. Heeley.
It.	Eutella	3d Off. D. Padone.
Br.	Erin	Capt. Wm. Tyson.
Span.	Espanol	S. de Fellerio.
Br.	Ethiopia	John Wilson.
	Etruria	T. Cook.
Am.	Eureka	R. B. Quick.
Br.	Exeter City	Thos. L. Weins.
Nor.	Faedrelandet	A. C. Brunn.
Br.	France	A. D. Hadley.
Ger.	Fulda	R. Ringk.
Br.	Furnessia	J. Hedderwick.
	Galileo	R. T. Jones.
	Gallia	M. Murphy.
Dan.	Geiser	C. W. Möller.
Ger.	Gellert	W. Kuhlewein.
Br.	Germanic	B. Gleadell.
	Gothenburg City	James Harrison.
	Greece	A. J. Jeffrey.
	Grecian	C. E. LeGallais.

	Name of vessel.	Captain.
Span.	s. s. Guido	Capt. J. M. Echevarria.
Br.	Gussie	Robert Staples.
Ger.	Hammonia	H. F. Schwenson.
Dan.	Hekla	A. G. Thomsen.
Br.	Helvetia	G. Cochran.
	Herschel	G. Braithwaite.
Nor.	Hertha	M. C. Nygaard.
Br.	Hibernian	John Brown.
	Holland	Thos. Foote.
Am	Hudson	H. B. Freeman.
Br.	India	J. Jameson.
Am.	Indiana	W. J. Boggs.
Br.	Iowa	E. W. Owens.
Dan.	Island	W. Skjodt.
Br.	Istrian	T. H. Fox.
	Italia	Thos. Craig.
	Italy	W. Pearce.
	Jamaican	John Coward.
	Kansas	W. Gleig.
Ger.	Kehrwieder	H. Spliest.
Br.	King's Cross	G. J. Mills.
Nor.	Komander Svend Foyn	J. Brydo.
	Knickerbocker	F. Remble.
Ger.	Kronprinz Fr. Wilhelm	Kuhlmann.
Fr.	La Bourgogne	E. Frangnel.
	La Bretagne	M. de'Jousselin.
	La Champagne	L. Boyer.
Ger.	Lahn	H. Hellmers.
Br.	Lake Huron	M. L. Tranmar.
	Lake Ontario	H. Campbell.
	Lake Superior	W. Stewart.
Am.	Lampassas	M. B. Crowell.
Fr.	La Normandie	G. de Keroabiec.
Dtch.	Leerdam	G. Stenger.
Br.	Lero	C. H. Holltum.
Ger.	Lessing	H. Behrends.
Br.	Llandaff City	T. H. Gore.
	Lord Clive	P. Urquhart.
	Lord Gough	E. M. Hughes.
	Lord O'Neill	J. A. Ferris.
Am.	Lorenzo D. Baker	Warren F. Wiley
Br.	Lydian Monarch	T. C. Huggett.
	Madura	K. Doyle.
	Maine	H. Murrell.
Am.	Manhattan	Frank Stevens.
Br.	Manitoban	Wm. Dunlop.
	Maranhense	F. B. Tregarthen.
	Marsca	L. O. Moen.
	Marengo	T. M. Irwin.
	Marsala	N. Maas.
	Maryland	A. H. Luckhurst.
	Mentmore	C W. Simpson.
	Michigan	S. Walters.
	Minnesota	R. J. Blackin.
	Montreal	F. Bouchette.
Span.	Murciano	E. de Luzzaraga.
Br.	Muriel	G. S. Locke.
Span.	Navarro	S. de Aldecocea.
Br.	Nessmore	G. Elliott.
Am.	Nueces	J. Bolger.
Fr.	Neustria	P. Verriers.
Br.	Nevada	J. A. R. Cushing.
Am.	Newport	Chas. C. Lima
Belg.	Noordland	H. E. Nickels.
Nor.	Norrona	J. J. Isakjen.
Br.	Norseman	R. Williams.
	Ocean Prince	W. J. Williams.
	Ohio	R. W. Sargent.
	Olympia	J. Sevain.
	Oregon	E. Polemann.
	Orinoco	J. S. Garvin.
	Pavonia	A. McKay.
Dtch.	P. Caland	T. H. Bonjer.
Br.	Pennsylvania	E. B. Thomas.
	Petriana	S. W. Ryder.
Am.	Philadelphia	Samuel Hess.
Belg.	Pieter de Coninck	E. Smit.
Ger.	Polaria	Burgwandt.
	Polynesia	A. Kühn.
Br.	Pomona	J. Legoe.
	Prof. Morse	C. F. Hardie.
	Red Sea	C. Baker.
Br.	Republic	H. Davison.
Ger.	Rhaetia	H. Vogelgesang.
	Rhein	W. Kuhlmann.
	Rhynland	J. C. Jamison.
Br.	Richmond Hill	A. Hyde.
	Roman	E. Maddox.
Belg.	Rosse	T. Henning.
Dtch.	Rotterdam	G. Bakker.
Ger.	Rugia	R. Karlowa.
	Saale	H. Richter.
Br.	Saint Albans	R. Sturrocks.
	Saint Ronans	H. Campbell.
	Santiago	R. Potter.
	Sarmatian	Wm. Richardson
	Samana	H. Bermpohl.
	Sarnia	J. Gibson.
	Scandinavian	John Park.
Dtch.	Schiedam	K. Mensonides.
	Scholar	J. Carbishley.
Br.	Servia	H. McKay.
	Siberian	R. P. Moore.
	Sidonian	B. Jamison.
Ger.	Slavonia	H. Schmidt.
Br.	Sorrento	F. W. Ouston.
	Spain	W. A. Griffiths.
	State of Georgia	G. Moodie.
	State of Indiana	A. Ritchie

	Name of vessel.	Captain.
Br.	s. s. State of Nebraska	Capt. A. G. Bra
	State of Nevada	J. A. Stew
	State of Pennsylvania	A. J. A. M
	State of Texas	Gilbert Wi
	Stockholm City	W. Thomp
Ger.	Suevia	H. Bahrau
	Suppicich	R. W. Nea
Br.	Sussex	J. P. O'Call
Belg.	Switzerland	J. Ueberwa
Ger.	Taormina	Koch.
Br.	The Queen	J. P. Hea
Dan.	Thingvalla	S. T. H. La
Br.	Thornhill	James Wil
	Tomas Brooks	E. F. Cand
	Toronto	Jas. McA
	Tower Hill	F. Archer.
Ger.	Trave	W. Willia
Br.	Trinacria	Geo. Mitch
	Trinidad	W. J. Fras
	Umbria	W. McMu
Belg.	Vaderland	C. H. Gran
Br.	Vancouver	C. J. Lind
Nor.	Viking	S. H. Fris
Br.	Viola	L. Murray.
	Virginian	M. Fitt.
Belg	Waesland	H. Busch
	Wallachia	W. Crosbe
Ger.	Wandrahm	C. W. Rehs
Dtch.	W. A. Scholten	G. Bakker.
Ger.	Werra	B. Bussin.
	Wieland	A. Albers.
Br.	Wisconsin	Edward Be
	Wyanoke	R. B. Boat
	Wyoming	C. L. Rigb
Dtch.	Zaandam	W. Pausen.
	Zeeland	E. Bence.
	Sailing vessels.	
Am	bk. Abyssinian	H. Hughes.
	Ada P. Gould	W. B. Hea
Ger.	sp. Anna	J. Menken
	schr. Anna E. Krans	F. H. Pet
Swed.	bk. Arab Steed	C. A. Skar
Am.	bk. Alice	W. G. Kai
Am.	bk. Bonny Doon	Chas. Burp
Br.	bk. C. S. Parnell	McLaughl
	bkt. Diadem	J. Cross.
	bg. Emma Ernest	Mate N. Diesers.
Am.	bk. Florence	A. P. Gou
Nor.	bk. Grundloven	Capt. O. G. Ellin
Am.	bkt. Harriet S. Jackson	W. S. Bar
Am.	bg. H. B. Hussey	G. W. Hol
Nor.	bk Hermon	O. Olsen.
Am.	bk. John H. Crandon	W. T. Richa
	schr. John J. Hanson	L. J. Steve
	bkt. John J. March	F. F. Whi
	bk. John R. Stanhope	J. B. Nort
Port.	bk. Julius	F. Do Vie
Am.	schr. Kennett	J. A. Smith
	bg. L. F. Munson	J. P. McK
	sp Light-ship No. 37	Andrew Jac
	bk. Levanter	Geo. F. Ger
Br.	bk. Lillian B. Jones	E. T. Petti
Br.	bkt. Louise Adelaide	Edgar Orr.
Am.	bg. Mary Fink	D. B. Dam
Aus.	bk. Mattea	G. V. Vida
Am.	bk. Megunticook	Ed. E. Wa
	schr. Messenger	N. H. Fall
Nor.	bk. Nanny	C. Wilhelm
Am.	schr. Nantasket	F. A. Richa
	Nelson Bartlett	J. W. Wat
	Orlando	Chas. Knu
	Phœbe	M. Mederi
Ger.	bk. Pillau	G. Gerlach.
Am.	schr. St. Croix	E. C. Rose
	bk. Syra	E. H. Patte
	Vauban	C. Bourge
Am	sp. Western Chief	H. Vogeni
	schr. Wm. F. Green	W. E. Cro
	United States Naval.	
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	U. S. F. C. Albatross	Z. L. Tans
	U. S. S Atlanta	F. M. Bun
	U. S. C. S. Blake	J. E. Pille
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	U. S. S. Jamestown	C. J. Train
	U. S. S. Michigan	H. F. Pick
	U. S. S. Minnesota	G. C. Wilso
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	U. S. S. Pensacola	A. R. Tate
	U. S. S. Pinta	John S. No
	U. S. S. Portsmouth	Edwin Wh
	U. S. S. Quinnebaug	W. M. Folg
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	U. S. S. Saratoga	C. H. Davis
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	U. S. R. S. Wabash	C. C. Carp
	U. S. S. Yantic	O. F. Heye

UNITED STATES SIGNAL SERVICE

MONTHLY WEATHER REVIEW.

VOL. XVI. WASHINGTON CITY, APRIL, 1888. No. 4.

INTRODUCTION.

This REVIEW treats generally the meteorological conditions of the United States and Canada for April, 1888, and is based upon the reports of regular and voluntary observers of both countries. Descriptions of the storms that occurred over the north Atlantic Ocean are also given, and their approximate paths shown on chart i, on which also appears the distribution of field-ice and the limits of fog-belts west of the fortieth meridian.

The marked departures from the normal atmospheric pressure for this month is worthy of mention, the pressure being decidedly above the normal in all parts of the country, except in southern California.

The rainfall was largely deficient on the Pacific coast, in the central valleys, south Atlantic and Gulf states; it was much above the average in the Rio Grande valley and in the adjacent portions of the southern slope and central Texas.

The month was warmer than the average in the Southern States, Rocky Mountain districts, and on the Pacific coast, the mean temperatures ranging from 2° above the normal in the Gulf States to more than 6° above in the Rocky Mountain regions; it was slightly colder than the average from the upper Mississippi valley eastward to the New England coast.

In this REVIEW appears the first summary for the season of 1888 of observations of temperatures and rainfall in the cotton regions, a comparison of which with means of April of former years shows, in general, the same features as exhibited by reports from the regular Signal Service stations, viz., high mean temperatures, and, with the exception of the district of Galveston, marked deficiencies of rainfall.

In the preparation of this REVIEW the following data, received up to May 20, 1888, have been used, viz., the regular tri-daily weather-charts, containing data of simultaneous observations taken at 133 Signal Service stations and 21 Canadian stations, as telegraphed to this office; 181 monthly journals and 179 monthly means from the former and 21 monthly means from the latter: 319 monthly registers from voluntary observers; 60 monthly registers from United States Army post surgeons; marine records; international simultaneous observations; marine reports through the co-operation of the Hydrographic Office, United States Navy, and the "New York Herald Weather Service;" monthly weather reports from the local weather services of Alabama, Arkansas, Colorado, Illinois, Indiana, Kansas, Louisiana, Michigan, Minnesota, Mississippi, Missouri, Nebraska, Nevada, New England, New Jersey, North Carolina, Ohio, Oregon, Pennsylvania, South Carolina, and Tennessee, and the Central Pacific Railway Company; trustworthy newspaper extracts, and special reports.

ATMOSPHERIC PRESSURE (expressed in inches and hundredths).

The distribution of mean pressure for April 1888, determined from the tri-daily telegraphic observations of the Signal Service, is shown by isobarometric lines on chart ii, from which it will be seen that the mean pressure for this month is greatest over a region extending from the Great Lakes southward to the Atlantic and Gulf coasts, the means generally ranging fram 30.15 to 30.17. The lowest barometric means occur in the Rocky Mountain districts, where they are below 30.0 at most stations.

The departures from the normal pressure at the various Signal Service stations are given in the table of miscellaneous meteorological data. The pressure is nowhere below the normal and there is, comparatively, but a small area, viz., central and southern California, over which it is not above the normal. As it seldom occurs that the mean pressure of a month exceeds the normal over so much of the United States as is the case this month, this feature, together with the marked excess over the whole territory east of the Rocky Mountains, makes the month, with regard to mean pressure, an exceptional one. Over nearly all of the region east of the Rocky Mountains the departures amount to from .10 to .17 and there is but a limited area, viz., California and portions of Arizona and New Mexico, in which they fall below .05.

Compared with the preceding month a deficiency is shown over the region between the Mississippi River and Rocky Mountains, the departures being less than .05 except in Montana, Dakota and Minnesota where they range from .05 to .13. East of the Mississippi River, in the northern and central plateau, and thence westward to the Pacific, the mean pressure of April is greater than that for March, the excess amounting to .10 or slightly more on both the north Pacific and New England coasts.

BAROMETRIC RANGES.

The monthly barometric ranges at the various Signal Service stations are also given in the table of miscellaneous meteorological data. The ranges, as usual, conform to the general rule; that is, they increase with the latitude and decrease slightly, though somewhat irregularly, with increasing longitude. In the states bordering on the Atlantic the extreme ranges are: .29 at Key West, Fla. and 1.03 at Albany, N. Y.; between the eighty-second and ninety-second meridians, .37 at New Orleans, La., and 1.08 at Alpena, Mich.; between the Mississippi River and Rocky Mountains, .39 at Galveston, Tex., and 1.42 at Fort Totten, Dak.; plateau regions, .43 at Prescott and Yuma, Ariz., and .97 at Fort Bridger, Wyo.; Pacific coast, .35 at Los Angeles and San Diego, Cal., and .76 at Port Angeles, Wash. The ranges for April, 1888, are about normal in the southern portions of the country, on the Pacific coast, and in the Lake region. In the Missouri Valley they exceed the normal from .20 to 40, while in New England they are from .10 to .20 below the normal.

AREAS OF HIGH PRESSURE.

During the month of April, 1888, nine well-defined areas of high pressure have passed across the territory covered by the tri-daily weather charts. Eight of these originated in the Northwest Territory, and one on the north Pacific coast. The general direction of movement was to the southeast, and all but two reached the Atlantic coast.

The following table shows, for each area, the latitude and longitude in which its centre was first and last observed, the highest observed barometer readings, and the average velocity in miles per hour:

Number of area.	First observed.		Last observed.		Highest observed barometer reading.	Average hourly velocity.
	Lat. N.	Long. W.	Lat. N.	Long. W.		
	° ′	° ′	° ′	° ′	*Inches.*	*Miles.*
I	46 50	103 50	40 20	72 50	30.42	28.1
II	42 00	124 00	38 10	73 10	30.56	33.4
III	50 10	100 00	35 00	76 00	30.66	34.5
IV	47 15	100 00	37 45	81 00	30.26	34.0
V	51 00	100 00	36 20	73 25	30.44	33.2
VI	51 00	114 00	38 50	88 30	30.58	50.8
VII	49 45	103 00	33 00	81 20	30.46	23.3
VIII	50 20	101 50	35 00	74 45	30.64	31.8
IX	52 00	111 50	51 45	90 00	30.94	39.6

Average rate of progress, 34.3 miles per hour.

I.—This area of high pressure developed over northern Dakota on the night of the 1st, when the highest pressure was not more than 0.1 above the normal. On reaching the Lake region the pressure at the centre began to increase and when last observed was 30.42 along the coasts of Connecticut and New Jersey, on the morning of the 4th. Light winds and fair weather attended the area throughout its course. A fall in temperature of from 10° to 20° in twenty-four hours occurred over the Ohio Valley and the Lake region on the morning of the 3d, when the temperature at nearly all stations to the north of the Ohio River was below freezing. A sharp fall in temperature occurred over the middle Atlantic states, but did not cause frosts. The lowest temperature of the month occurred over eastern Montana and northern Dakota on the 1st and 2d.

II.—The morning chart of the 4th indicated the advance eastward from the Pacific of an area of high pressure which was apparently central on the north Pacific coast at 10 p. m. of the 4th. The area moved eastward, maintaining a central pressure near 30.2 until central over the lower Missouri valley, when the pressure began to rise. At 7 a. m. of the 6th a second centre had developed on the northern border of the area. On the following morning the two centres had combined in one situated to the north of Lake Superior, and the central pressure had increased to 30.56 at Prince Arthur's Landing, the highest reported during the existence of the area. From this position it moved to the southeast and passed to the ocean from the coast of the middle Atlantic states on the afternoon of the 9th. Generally fair weather attended the area, though light local rains were reported from a few stations located on its outer limits. It was accompanied by a fall in temperature, amounting to 10° over the northern and middle plateau districts, 20° over the northern and middle slopes of the Rocky Mountains and the Missouri Valley, and ranging from 20° to 30° in twenty-four hours over the Ohio Valley and the Lake region. The lowest temperature of the month over eastern Minnesota, northern and eastern Michigan, the lower lake region, Pennsylvania, New York, and New England states occurred under the influence of this area.

III.—This area was first observed to the north of Dakota, where it was central on the morning of the 11th, and extended southeastward to the Gulf of Mexico. Light winds and fair weather prevailed throughout the United States, excepting over the lower lake region and along the Atlantic coast, where rain occurred, due to the influence of an area of low pressure then central north of Lake Ontario. The area moved nearly south until central over Kansas, where the movement was more to the eastward. Before reaching the coast the area broke up into several portions, one central in Texas, another central in the eastern Gulf states, and still another central on the coast of North Carolina, all disappearing by a gradual decrease of pressure. Fair weather prevailed in all parts of the area. The fall in temperature was very light, amounting usually to about 10°, but, in rare instances, reaching 20° in twenty-four hours.

IV.—This area was central in Dakota on the afternoon of the 13th. It moved in a southeasterly direction, disappearing from the charts after 7 a. m. of the 15th. It was attended by light winds and fair weather, with only a slight fall in temperature.

V.—This area was central in Manitoba on the afternoon of the 15th, the pressure at the centre being but slightly above the normal. It moved to the southeast during the 16th and 17th over the Lake region and the middle Atlantic states, the pressure reaching 30.44, the highest attained during its existence. Light rains occurred within the eastern limits, probably due to an area of low pressure then in advance, and also within the limits of this area of high pressure, probably due to the area of low pressure which followed it. No dangerous winds were reported. The fall in temperature was light, being greatest in the lower Missouri valley, Illinois, Indiana, and along the coast of the south Atlantic states, where it amounted to 20° in twenty-four hours.

VI.—The 10 p. m. chart of the 17th shows the advance isobars of an area of high pressure which apparently moved southeastward from the north Pacific. Its centre was first located within the region of observation on the morning of the 17th. It moved rapidly to the southeast with decreasing pressure and disappeared from the charts while over Illinois on the afternoon of the 18th, having united with the following area which was then central north of Dakota. It was accompanied by light winds and fair weather, excepting in the eastern limits of the area, where light rains occurred, probably due to the influence of an area of low pressure hereafter described as area number vi. There was a fall of from 10° to 20° in temperature over the northern and middle slopes of the Rocky Mountains and the Missouri Valley. At 3 p. m. of the 17th the temperature was 30° lower over Kansas than at the same time on the preceding day, a fall of 24° in the previous eight hours being shown at Leavenworth.

VII.—The 10 p. m. chart of the 18th shows the atmospheric pressure everywhere in the United States to the east of the Mountains to be above the normal, excepting over the New England States, where it was only slightly below. The area was central in northern Dakota. It moved slowly and irregularly southeastward and passed off the coast of the south Atlantic states after the 7 a. m. observation of the 22d, the central pressure having steadily declined until it was slightly above the normal. Light rains within the eastern limits of the area were reported over the lower lake region, the Ohio Valley, and along the coast of the south Atlantic and east Gulf states. In all other districts within the area fair weather, with light winds, prevailed, excepting over the lower lakes on the night of the 18th, where some stations reported maximum wind-velocities of thirty-five miles. The fall in temperature was less than 10° in twenty-four hours over a large portion of the country traversed by the area, but in a few instances the fall amounted to 20° in twenty-four hours. The minimum temperatures of the month occurred on the 20th, 21st, and 22d over the Missouri Valley, Kentucky, Tennessee, Arkansas, and the eastern Gulf states.

VIII.—The centre of this area of high pressure appeared north of Dakota on the morning of the 23d, and the area extended from the Rocky Mountains eastward to the Appalachian Mountains, and as far south as Arkansas. The area moved to the southeastward and was central over Lake Superior on the morning of the 24th, when it extended over all of the United States east of the Rocky Mountains. The pressure at the centre slowly increased as it approached the coast to 30.64, the highest reported. From 10 p. m. of the 26th to 10

p. m. of the 27th the centre was apparently located on the coast near Wilmington, N. C., after which the pressure began to decrease, and at 3 p. m. of the 28th the area had entirely disappeared from the charts. Fair weather and light winds prevailed within its limits, excepting in a few instances where light and heavy local rains were reported, and during the 25th and 26th, when winds were high over the Florida Peninsula and on the coast of Texas. At 3 p. m. of the 23d the fall in temperature over the middle slope of the Rocky Mountains, Missouri, and the northern part of Arkansas ranged from 20° to 30°; along the coast of the south Atlantic states on the afternoon of the 24th the fall in temperature amounted to 20°, while in all other localities it amounted to 10° or less in twenty-four hours. The minimum temperature of the month occurred at a number of stations in Virginia and North and South Carolina on the 25th and 26th.

IX.—This area of high pressure appears to the north of Montana on the 3 p. m. chart of the 27th. It moved eastward, at the same time extending rapidly southward along the eastern slope of the Rocky Mountains as far as Texas, the pressure at the most northerly station being 30.94. After 10 p. m. of the 28th the movement of the area was apparently to the northeast, passing beyond the region of observation. There was a fall of temperature on the afternoon of the 29th at Chicago, Ill., and Detroit, Mich., of 44° in twenty-four hours, but generally the fall amounted to 20° or less. At 7 a. m. of the 29th and 30th the temperature reached the freezing point and below over Montana, Wyoming, Colorado, Dakota, Nebraska, Kansas, Minnesota, western Iowa, northern Wisconsin, and northern Michigan, and the minimum temperatures of the month occurred over southern Wyoming, western Nebraska, western Kansas, Colorado, New Mexico, Indian Territory, and Texas.

AREAS OF LOW PRESSURE.

Nine areas of low pressure have been traced during April across the territory occupied by stations of observation. Of this number, seven were first observed west of the one hundred and seventh meridian and north of the fortieth parallel; one developed in New Mexico, and one appeared off the coast of New England. The tracks followed by the centre of each area, as determined from tri-daily observations, are shown on chart i. That described as number ii was the severest storm of the month.

The following table shows the latitude and longitude in which each area was first and last observed, the lowest pressure observed within each area, and the average velocity in miles per hour:

Number of area.	First observed.		Last observed.		Lowest observed barometer reading.	Average hourly velocity.
	Lat. N.	Long. W.	Lat. N.	Long. W.		
	° ′	° ′	° ′	° ′	*Inches.*	*Miles.*
I	49 00	123 00	45 00	60 30	29.40	68.8
II	48 45	123 00	48 20	67 00	29.30	41.7
III	33 00	113 00	44 00	62 35	29.42	26.5
IV	53 00	113 40	46 10	58 50	29.56	26.6
V	50 45	107 00	37 20	75 00	29.72	40.1
VI	45 45	112 40	49 40	65 20	29.52	39.7
VII	50 35	110 00	45 00	60 00	29.34	36.0
VIII	40 30	67 50	48 10	64 50	29.46	18.8
IX	49 00	118 00	52 00	95 45	29.32	24.6

Average rate of progress, 35.9 miles per hour.

I.—The tri daily charts of the last two days of the preceding month indicated the advance eastward from the north Pacific of an area of low pressure, which at 10 p. m. of March 31st was apparently central in northwest Washington, and extended southeastward to Texas. At the following observation the depression had moved southeastward and was central in the Missouri Valley. After 10 p. m. of April 1st the area, which had become very much elongated in a northeast and southwest direction, divided into two portions, one remaining central over Texas and gradually disappearing by increase of pressure, the other moving to the northeast with decreasing pressure, and passing beyond the region of observation after 10 p. m. of the 2d. At 10 p. m. of the 1st light rain began over the lower lake region, New York, and the New England States, continuing during the 2d. Slightly higher temperature prevailed.

II.—This depression apparently moved southeastward from the north Pacific Ocean. The pressure at the centre steadily decreased until the lowest point, 29.30, was reached at Fort Sully, Dak., at 3 p. m. of the 4th, after which it rapidly increased to 29.6 which was maintained with slight changes. Light rains occurred over the Pacific coast regions on the 3d and 4th, but no rain occurred within the area over Rocky Mountain districts. Precipitation began in the eastern quadrants of the storm on the afternoon of the 4th over the upper Mississippi valley and the Lake region, and became general within the area on the night of the 5th over the middle Atlantic and New England states. The depression caused high winds over the eastern slope of the Rocky Mountains on the 4th, and severe southeasterly, changing to westerly and northwesterly, gales over the Lake region and along the coast of the middle Atlantic states on the 5th and 6th. The rise in temperature attending the depression was greatest over the Ohio Valley on the morning of the 5th, and over the lower lake region on the afternoon of the 5th, when it exceeded 20°, but in other districts the rise rarely amounted to 20°, and usually was 10°, or less, in twenty-four hours.

III.—Two areas of low pressure appear on the 10 p. m. chart of the 7th, one to the north of Montana, the other in southern New Mexico. The first moved eastward, its centre remaining to the northward of the region of observation; the second moved northeast, and at 3 p. m. of the 9th both had united in one area, nearly circular in shape, central over the lower Missouri valley. The central pressure decreased over the Lake region to 29.4 and increased to 29.9 over the New England States. Rain became general within the area at 10 p. m. of the 8th and continued. Severe gales prevailed over the Lake region from the 9th to 11th, and along the coast of the middle Atlantic and New England states on the 10th and 11th. The increase of temperature was slight, amounting usually to about 10° and rarely to as much as 20° in twenty-four hours.

IV.—This area was first observed on the afternoon of the 11th, extending southward over Montana. The pressure at the most northerly stations of observation was nearly normal. The area moved to the southeast with slowly decreasing pressure, its centre remaining to the northward of the region of observation until the morning of the 14th, when it was central over the lower lakes. On reaching the coast of the New England States the direction changed to the northeast, and when last observed off the coast of Nova Scotia the pressure had declined to 29.56, the lowest observed during the existence of the area. Rain became general on the night of the 14th over a small area immediately about the centre of the storm, passing over in turn the lower lake region, New York, and the New England States. Moderate gales occurred over the Lakes on the 13th and 14th, and at a few stations on the coast on the morning of the 15th.

V.—This depression developed in the Northwest Territory, and moved southeast to the coast of Virginia. It displayed but feeble energy, the pressure being only slightly below the normal. Light winds and fair weather prevailed within its limits until the afternoon of the 15th when light rain began in the northern quadrants over the lower lake region and the northern half of the middle Atlantic states.

VI.—An area of low pressure originated in the northern Rocky Mountain districts on the 15th and moved to the southeastward, the pressure increasing slowly until near the normal. While over the lower Missouri valley the direction of movement changed to the northeast, and it passed to the Gulf of Saint Lawrence on the afternoon of the 19th, the pressure having decreased to 29.52. Winds were brisk over the northern and middle slopes of the Rocky Mountains on the 15th and 16th, but decreased in force over the Lakes. Fair weather prevailed until the night of the 16th, when light rains began. The increase of temperature was not marked, amounting usually to about 10° in twenty-four hours.

VII.—This storm was of feeble energy. It was first observed in the Northwest Territory and was central in northern Montana on the morning of the 20th. Rain began in the northern quadrants of the storm on the afternoon of the 22d. Winds were light, excepting on the coast of North Carolina, where maximum velocities of thirty-five miles were reported. The maximum temperatures of the month were reported on the 21st and 22d from stations in Wyoming, south Dakota, Nebraska, Kansas, Colorado, and Utah, and on the 19th and 20th from stations in Washington and Oregon.

VIII.—On the 3 p. m. chart of the 20th an area of low pressure is shown to be central in the Atlantic east of Massachusetts. It moved in a direction slightly to the east of north across the Maritime Provinces of Canada, the pressure decreasing to 29.46 when last observed at 7 a. m. of the 22d. It was attended by light winds and rain or snow.

IX.—This depression probably moved southeastward from the north Pacific. Its direction of movement changed near the one hundred and seventh meridian. The area was stationary near Fort Buford, Dak., from 10 p. m. of the 24th for twenty-four hours, when the pressure declined to 29.32. It disappeared to the northeast after 3 p. m. of the 26th. Generally fair weather prevailed within the area until the night of the 25th, when light rains occurred over Montana and Dakota. High winds were reported over Nebraska, Dakota, and northern Minnesota during the 24th and 25th. Under the influence of this area the maximum temperatures occurred over eastern Montana, northern Dakota, and Minnesota.

NORTH ATLANTIC STORMS FOR APRIL, 1888.

[*Pressure in inches and millimetres; wind-force by Beaufort scale.*]

The paths of the depressions that appeared over the north Atlantic Ocean during April, 1888, have been determined from international simultaneous observations by captains of ocean steamships and sailing vessels, received through the co-operation of the Hydrographic Office, Navy Department, and the "New York Herald Weather Service."

Of the ten depressions traced, seven originated west of the fiftieth meridian, and pursued east to northeast tracks over Newfoundland or the Grand Banks; one advanced northwestward from the vicinity of the Azores; one moved eastward over the Bay of Biscay, and one first appeared over mid-ocean near the fifty-fifth parallel, and thence passed eastward to the British Isles. The month opened with unsettled weather and fresh to strong gales between the thirtieth and sixtieth meridians, attending the presence of two areas of low pressure, one of which was located over the Banks of Newfoundland, and the other to the northward of the Azores. A third depression was apparently central off the coast of Portugal. Over the British Isles and off the American coast south of the fortieth parallel the pressure was relatively high. During the balance of the first decade the weather continued unsettled over the western portion of the ocean, with marked barometric fluctuations. During this period the pressure continued generally high east of the thirtieth meridian. From the 10th to the 20th, inclusive, three important storms appeared, one of which traversed the ocean from coast to coast; one passed from the Banks of Newfoundland to the eighteenth meridian, and one, of tropical or subtropical origin, advanced from the vicinity of Bermuda to Newfoundland, and thence moved northeastward and disappeared over mid-ocean. During the third decade high barometer and generally fair weather prevailed over mid-ocean until the 29th, during which and the following date fresh to strong gales occurred. Over the British Isles and the ocean to the southward the last ten days of April constituted the stormy period of the month, although from the 25th to the 27th, inclusive, the barometer was high in that region. From the 20th to the 24th the weather was unsettled west of the fiftieth meridian, after which fair weather and high barometer prevailed until the 28th, when the advance northnortheastward of a depression of small energy from near Bermuda caused lower pressure and moderate gales.

In April, 1887, eleven depressions were traced, the tracks predominating to the southward and southeastward of Nova Scotia and Newfoundland. But one depression was traced from American waters to the European coast. The general character of the weather over the ocean was very severe, and gales of hurricane force were encountered off the coast of the United States during the first five days of the month. From the 12th to the 16th, inclusive, storms of exceptional violence occurred over, and to the eastward of, the Banks of Newfoundland. During the last decade of the month the weather conditions in the trans-Atlantic routes were more settled, although strong gales were experienced over the western portion of the ocean from the 26th to the 29th.

As compared with the corresponding month of previous years the storms of April, 1888, were deficient in number and energy.

In the following descriptions of the depressions traced, positions are given in degrees, latitude and longitude, except in cases where twenty-five to thirty-five minutes are cited, when they are shown in degrees and half degrees:

1.—This depression was central on the 1st over the southeastern part of the Banks of Newfoundland, whence it had advanced from the westward. In this position barometric pressure below 29.50 (749.3) was shown, and moderate to fresh gales prevailed. By the 2d the centre of depression had moved northeast to the thirty-ninth meridian, with an increase in pressure of about .20 inch, after which it apparently recurved westward under the influence of a depression passing northeast over Newfoundland, and an area of high pressure overlying the ocean east of the thirtieth meridian.

2.—This was a well-defined storm of small energy which moved northwest from the vicinity of the Azores during the 1st and united with depression number 1 by the 2d.

3.—This depression was a continuation of land low-area number i which traversed the North American continent and passed eastward from Nova Scotia during the 2d. On the morning of the 3d the depression was central off the west coast of Newfoundland, with pressure below 29.60 (751.8), from which position it moved northeast beyond the region of observation.

4.—This depression was the continuation of land low-area number ii which traversed the American continent and advanced northeast over the Gulf of Saint Lawrence during the 6th. On the 7th the storm was central near Anticosti Island, and thence advanced over the ocean north of Newfoundland.

5.—This depression first appeared on the 10th off the east edge of the Banks of Newfoundland, with pressure about 29.70 (754.4), whence it advanced east-northeast to the westward of the British Isles by the 15th, attended by a gradual decrease in central pressure and gales of increasing energy. Subsequent to the 15th the storm-centre recurved south and west and united with depression number 6, which had followed closely in its wake.

6.—This depression is first charted southwest of Nova Scotia under date of the 13th, whence it moved rapidly east-northeast to the north of Ireland by the 17th, accompanied after the 14th by disturbances of pronounced strength. By the 18th the centre of depression had recurved southward over Ireland, with pressure falling below 29.50 (749.3), from which position it moved eastward beyond the region of marine observations.

7.—The pressure of this depression to the southward of Bermuda was indicated by reports of the 14th. By the 15th the storm-centre had moved northward to the fortieth parallel, and during the 16th and 17th remained nearly stationary

south of Newfoundland, with pressure falling to about 29.40 (746.7). By the 18th the depression had advanced northward over Newfoundland, with pressure below 29.20 (741.7). During the next two days the storm is given a probable east and northeast track to N. 55°, W. 38°, from whence it passed southeast and disappeared, or, as appears probable, continued an eastward course to the French coast as depression number 8.

8.—This depression moved slowly eastward over the Bay of Biscay during the 22d and 23d, with central pressure about 29.60 (751.8), after which it disappeared over the continent.

9.—This depression appeared over mid-ocean, near the fifty-fifth parallel, on the 29th, with pressure about 29.20 (741.7), and moved eastward to Ireland by the 30th, with barometric minimum about 29.00 (736.6), and strong to whole gales over a considerable area.

10.—This depression was unimportant, though well-defined, and advanced from the vicinity of Bermuda to Newfoundland during the 29th and 30th, its passage being unattended by noteworthy features.

OCEAN ICE.

On chart i the positions of icebergs and field ice reported during the month are shown by ruled shading. Mr. John Higgins, observer at Saint John's, N. F., reports, relative to ice, as follows: "Ice on the coast 13th to 18th; moving off 19th to 24th; cleared off, 27th; driving in, 28th to 30th." On the 1st the s. s. "Pontiac" passed twenty to thirty icebergs between Saint John's and Cape Pine. 2d, s. s. "Austrian" passed large quantities of detached field ice from N. 46° 00′, W. 52° 30′, to Saint John's, N. F. 4th, s. s. "Dorian," in N. 41° 40′, W. 49° 10′, at 7 a. m., encountered a large ice-field, and steered southerly till 8.30 p. m., when the western edge of the ice was abeam. 5th, s. s. "Michigan," in N. 41° 33′, W. 50° 00′, one moderate sized berg. 7th s. s. "Austrian," between Saint John's, N. F., and Cape Race, passed about forty bergs. 13th, s. s. "Bengore Head," in N. 47° 40′, W. 40° 00′, loosely packed field ice, and 14th same vessel, in N. 46° 32′, W. 52° 00′, field ice. 14th, bark "Lillian B. Jones," N. 46° 06′, W. 53° 46′, one large berg, and on 15th, same vessel, in N. 46°, 55′, W. 52° 45′, heavy field ice. 17th, heavy, close-packed ice blocked the coast at Cape Race. 19th, s. s. "Boston City" reported the coast of Saint John's, N. F., almost completely blocked with ice. 24th, s. s. "Portia," from Saint John's, N. F., to Cape Race, passed large quantities of heavy field ice and a great number of icebergs. 26th, s. s. "Nova Scotia," from N. 46° 31′, W. 53° 02′ to Saint John's, N. F., several bergs. 27th, s. s. "Vancouver," off Cape Race, ice-fields; in N. 47° 20′, W. 59° 54′, field ice. 28th, s. s. "Glendale," off Cape Race, quantities of field ice. 29th, large quantities of Arctic ice and bergs off Bacalhao Island. 30th, s. s. "Lake Huron," 75 miles wsw. of Cape Race, one iceberg. 30th, s. s. "Nova Scotian," between Cape Spear and Cape Race, several bergs and field ice.

The following table shows the southern and eastern limits of the region within which icebergs or field ice were reported for April during the last six years:

Southern limit.			Eastern limit.		
Month.	Lat. N.	Long. W.	Month.	Lat. N.	Long. W.
	° ′	° ′		° ′	° ′
April, 1883	40 49	52 06	April, 1883	48 00	43 00
April, 1884	41 26	48 46	April, 1884	45 25	43 34
April, 1885	41 40	49 50	April, 1885	44 10	39 41
April, 1886	40 51	46 39	April, 1886	47 43	30 11
April, 1887	40 02	50 04	April, 1887	48 00	38 18
April, 1888	41 33	50 00	April, 1888	47 40	49 00

Compared with the ice record for corresponding months of previous years the aggregate quantity of ice reported during April, 1888, was largely deficient, save in the immediate vicinity of the Newfoundland coast, where heavy field ice and icebergs were observed throughout the month. Ice was encountered on two dates only off the southern edge of the Banks of Newfoundland, and the latitudes in which it was reported corresponded closely with the average southern limit of ice for April. The easternmost ice reported for April, 1888, was over eight degrees west of the average eastern limit for the month.

FOG.

The limits of fog-belts to the westward of the fortieth meridian are shown on chart i by dotted shading.

As compared with the chart for March, 1888, slight changes are shown in the limits of the Newfoundland fog-belt, and the number of days during which fog prevailed in that region, twenty-two, was six more than the aggregate number of foggy days reported for the preceding month. Along the coast of the United States fog was more frequently encountered than in March, while its southern limit was contracted about one degree.

With the exception of four dates, the 25th to the 28th, inclusive, during which southerly winds and high barometer prevailed, the development of fog over the Banks of Newfoundland was dependent upon the circulation of winds in the south or east quadrants of low barometer areas. To the westward of the Grand Banks fog was reported on fourteen dates, its development, as a rule, attending the approach or passage of cyclonic areas.

The following are the limits of fog-areas on the north Atlantic Ocean during April, 1888, as reported by shipmasters:

Date.	Vessel.	Entered.			Cleared.		
		Lat. N.	Lon. W.	Time.	Lat. N.	Lon. W.	Time.
		° ′	° ′		° ′	° ′	
3	S. S. Murciano	40 58	50 13	.....	41 28	47 31	At intervals.
5-6	S. S. City of Washington.	New York.		3 p. m	37 03	74 45	3 p. m.
5-6	S. S. Holland	Off Sandy Hook		8 p. m..	40 15	73 08	4 a. m.
5-6	Brig Lucy W. Snow	Davis Shoal ship.		Lt. Noon.	42 04	69 38	Noon.
6	S. S. Chicago	42 02	66 49	1 a. m	42 03	68 10	8 a. m.
6	S. S. James Turpie	41 49	65 34	6 a. m.....	42 08	66 35	Noon.
7	S. S. Rhynland	41 32	46 59	3.30 p. m..	41 22	47 29	5.40 p. m.
7-8	S. S. India	41 55	47 40	8.30 p. m..	41 29	49 50	10 a. m.
8	S. S. Geiser	42 00	47 20	.....	41 10	50 25	4 p. m.
8	S. S. Buffalo	41 53	50 06	11.10 a. m.	42 08	48 58	3.40 p. m.
9	S. S. Polynesia	42 45	50 03	6 a. m	42 32	51 16	2 p. m.
10	S. S. Italy	42 35	48 23	1.30 a. m ..	42 44	48 01	4.12 a. m.
10-11	S. S. Dorian	40 24	72 53	.....	40 27	73 38	
11	S. S. Maine	38 00	73 00	2.30 a. m..	37 56	74 00	7.10 a. m.
11	S. S. State of Indiana	40 39	68 41	3 a. m	40 28	71 24	Noon.
11-12	S. S. City of Augusta	38 00	75 00	4 p. m	40 22	74 00	9 a. m.
13	Fog at Saint John's, N. F.						
13	S. S. Furnessia	43 54	49 00	7 a. m.....	43 30	49 30	9 a. m.
13	S. S. Oregon	40 11	50 20	3 a. m.....	45 37	51 40	7 a. m.
13-14	S. S. Bengore Head	47 30	49 44	10.30 p. m.	45 58	53 21	Noon.
15	S. S. Servia	40 30	68 48	8 a. m.....	40 29	69 00	8.28 a. m.
15-18	Fog at Saint John's, N. F.						
18	S. S. Brooklyn City	42 40	48 30	11.30 a. m.	42 36	48 54	3.30 p. m.
20	S. S. Balder	39 27	68 24	8 p. m	39 51	69 15	Midnight.
20	S. S. Lord Clive	42 40	49 30	6 p. m	42 36	50 10	9.30 p. m.
20-21	S. S. Picqua	40 32	66 45	6 p. m.....	41 19	67 10	4 a. m.
20-21	S. S. Catalonia	42 43	49 27	11.30 a. m.	42 22	51 17	7.50 a. m.
20-21	S. S. Bratsburg	37 31	72 20	Noon	41 06	68 35	8 a. m.
21	S. S. LaBretagne	41 50	61 35	8 a. m	41 45	62 10	11 a. m.
21	Fog at Saint John's, N. F.						
21-22	S. S. Siberian	42 30	49 00	11 p. m ...	42 30	50 00	8 a. m.
21-22	S. S. Fulda	43 51	48 00	8 p. m	43 20	56 00	2 a. m.
22	S. S. Wyoming	43 00	50 50	.....	42 47	52 07	
22	S. S. Switzerland	40 20	48 27	10 a. m....	40 12	49 07	1 p. m.
22	S. S. Thingvalla	46 20	44 30	.....	44 32	48 26	
22-23	S. S. Norseman	43 56	47 00	4 p. m.....	43 23	51 00	8 a. m.
23	S. S. Thingvalla	44 09	48 52	.....	43 43	51 45	
23-24	S. S. Adriatic	43 35	48 32	.....	42 40	52 29	
24	S. S. Taormina	43 04	50 22	.....	42 46	51 50	8 p.m.
24	S. S. Trave	45 05	48 50	11.30 a. m.	44 30	52 10	8.30 p. m.
24-26	S. S. Bulgarian	46 53	41 50	7.30 p. m..	43 20	51 56	4 p. m.
25-26	S. S. British Prince	41 59	46 32	6 p. m	41 30	49 13	6 a. m.
26-27	S. S. Aurania	44 10	46 00	3.04 p. m..	43 00	51 00	3.24 a. m.
26-27	S. S. Arizona	42 32	48 21	10 p. m ...	41 53	52 04	9 a. m.
27-28	S. S. Hibernian	41 40	49 04	7 p. m	41 38	52 00	10.50 a. m.
27-28	S. S. Auriana	41 42	58 50	11.44 p.m..	41 00	65 00	4.20 p. m.
28	S. S. Baltimore	38 20	66 20	Noon	38 08	67 16	4 p. m.
28	S. S. Waesland	41 15	46 34	9.45 a. m..	41 03	47 04	Noon.
28-29	S. S. British Prince	40 02	65 16	11 p.m....	39 47	68 03	10 a. m.
29	S. S. Lydian Monarch	40 33	64 05	1 p.m.....	40 30	66 00	11 p. m.
29-30	S. S. Galileo	41 38	46 40	12.20 p. m.	41 19	49 10	10.45 p. m.
30	S. S. Hibernian	40 20	62 30	5 a. m.....	40 05	66 09	8 a. m.
30	S. S. Lydian Monarch	40 35	71 50	7 p. m	40 35	72 10	9.45 p. m.
30	S. S. Rhaetia	44 33	45 40	.....	.....	.....	
30	S. S. Lahn	44 13	42 45	10 p.m....	44 09	42 57	10.45 p. m.

TEMPERATURE OF THE AIR (expressed in degrees, Fahrenheit).

The distribution of mean temperature over the United States and Canada for April, 1888, is exhibited on chart ii by dotted isothermal lines. In the table of miscellaneous data are given the monthly mean temperatures, with the departures from the normal, for the various stations of the Signal Service. The figures opposite the names of the geographical districts in the columns for mean temperature, precipitation, and departures from the normal, show respectively the averages for the several districts. The normal for any district may be found by adding the departure to the current mean when the departure is below the normal, and subtracting when above.

In the northern districts from Minnesota eastward to New England and the Maritime Provinces of Canada the month was colder than the average. The deficiencies in the mean temperatures over about half of the area of the districts mentioned are less than 2°, and the only stations with long records showing deficiencies greater than 4° are Saint Paul, Minn., and Portland, Me. In the Southern States and, with the exception of the extreme northwest, over the whole region between the Mississippi River and the Pacific coast the month was warmer than the average, the excess over the normal temperatures amounting to 6°, or more, in northern California and over nearly all of the Rocky Mountain region. In the Southern States the mean temperatures generally ranged about 2° above the normal, except along the immediate coast, where the departures were less marked.

The following are some of the most marked departures from normal temperatures at Signal Service stations:

Above normal.	°	Below normal.	°
Red Bluff, Cal.	8.9	Saint Paul, Minn	5.5
Cheyenne, Wyo.	7.8	Portland, Me.	4.8
Winnemucca, Nev.	7.6	Quebec, Quebec	4.0
Boisé City, Idaho	7.5	La Crosse, Wis.	3.9
Salt Lake City, Utah	7.5	Marquette, Mich	3.8
Yuma, Ariz.	6.3	Wood's Holl, Mass.	3.7
Prescott, Ariz.	6.3	Albany, N. Y.	3.4
Denver, Colo.	6.2	Kingston, Ont.	3.0

By reference to the table of comparative maximum and minimum temperatures it will be seen that in numerous instances the maximum temperatures were higher than have previously been recorded in April since the establishment of Signal Service stations. The temperatures were remarkably high in California from the 12th to 14th, the maximum at Los Angeles, San Diego, and San Francisco being the highest April temperatures on the records of these stations. In the upper Ohio valley and in the Atlantic coast states, during the warm period of the 28–30th, the maximum temperatures were the highest April temperatures yet recorded, Baltimore, Md., Norfolk, Va., and Charlotte, N. C., reporting temperatures ranging from 90° to 93° on the 29th and 30th, being the highest April temperatures by from 1° to 2° on record at those stations. The minimum temperatures of the month were unusually low in some parts of the country. Those attending area of high pressure number ii in the Lake region and New England from the 6th to the 9th were from 10° to 20° below the freezing point, and at some stations on the New England coast were within 2° of the lowest ever recorded in April. At Fort Buford, Dak., on the 2d, a minimum of 6° was recorded, which is 4° lower than the previous April minimum of ten years' observations. Minimum temperatures on the north Pacific coast were also unusually low.

RANGES OF TEMPERATURE.

The monthly and the greatest and least daily ranges of temperature at Signal Service stations are given in the table of miscellaneous meteorological data. Along the Gulf coast and on the Pacific coast north of the fortieth parallel the monthly ranges were less than 30°, the least, 18°, being reported from Key West, Fla. In the extreme northwest they exceeded 70°, the greatest, 89°, occurring at Poplar River, Mont.

DEVIATIONS FROM NORMAL TEMPERATURES.

The following table shows for certain stations, as reported by voluntary observers, (1) the normal temperatures for a series of years; (2) the length of record during which the observations have been taken, and from which the normal has been computed; (3) the mean temperature for April, 1888; (4) the departures of the current month from the normal; (5) and the extreme monthly means for April during the period of observations and the year of occurrence:

State and Station.	County.	(1) Normal for the month of April.	(2) Length of record.	(3) Mean for April, 1888.	(4) Departure from normal.	(5) Extreme monthly mean temperature for April.			
						Highest.		Lowest.	
						Am't.	Year.	Am't.	Year.
		°	Years	°	°	°		°	
Arkansas.									
Lead Hill	Boone	61.3	6	65.3	+4.0	65.3	1888	56.7	1884
Washington	Hempstead	63.4	20	67.0	+3.6	.....	.....	.....	.....
California.									
Sacramento	Sacramento	59.2	22	59.5	+0.3	64.2	1875	53.3	1880
Salinas	Monterey	53.6	15	54.2	+0.6	58.9	1883	50.5	1882
Florida.									
Merritt's Island	Brevard	70.9	5	71.8	+0.9	74.9	1885	70.4	1887
Illinois.									
Riley	McHenry	44.4	27	43.7	−0.7	.....	.....	.....	.....
Peoria	Peoria	52.3	32	53.6	+1.3	.....	.....	.....	.....
Indiana.									
Vevay	Switzerland	54.8	21	56.1	+1.3	61.8	1866	47.4	1874
Logansport	Cass	53.0	34	52.0	−1.0	.....	.....	.....	.....
Spiceland	Henry	50.0	34	52.5	+2.5	.....	.....	.....	.....
Blue Lick	Clark	55.2	11	56.5	+1.3	.....	.....	.....	.....
Iowa.									
Independence	Buchanan	48.0	12	46.6	−1.4	51.0	1878	44.0	1877
Cresco	Howard	43.5	16	42.5	−1.0	.....	.....	.....	.....
Monticello	Jones	48.1	34	47.3	−0.8	56.0	1855	38.0	1857
Kansas.									
Independence	Montgomery	57.1	17	56.1	−1.0	61.7	1878	48.3	1874
Lawrence	Douglas	54.2	20	57.6	+3.4	58.6	1878	47.7	1874
Wellington	Sumner	55.9	10	59.3	+3.4	59.6	1880	50.7	1884
Louisiana.									
Grand Coteau	Saint Landry	68.6	6	70.6	+2.0	.....	.....	.....	.....
Point Pleasant	Tensas	66.0	8	68.0	+2.0	.....	.....	.....	.....
Maine.									
Gardiner	Kennebec	41.3	52	38.2	−3.1	45.9	1878	35.0	1874
Maryland.									
Cumberland	Alleghany	51.4	16	50.3	−1.1	57.6	1881	45.0	1874
Massachusetts.									
Somerset	Bristol	45.3	18	44.0	−1.3	.....	.....	.....	.....
Worcester	Worcester	44.2	50	39.5	−4.7	.....	.....	.....	.....
Michigan.									
Thornville	Lapeer	45.9	12	42.3	−3.6	.....	.....	.....	.....
Kalamazoo	Kalamazoo	46.5	13	45.7	−0.8	.....	.....	.....	.....
Adrian	Lenawee	45.8	11	45.3	−0.5	.....	.....	.....	.....
Nevada.									
Carson City	Ormsby	48.4	9	53.3	+4.9	56.1	1881	43.1	1880
New Jersey.									
South Orange	Essex	48.2	18	46.2	−2.0	52.9	1878	42.2	1874
New York.									
North Volney	Oswego	41.2	21	38.6	−2.6	50.9	1878	33.6	1874
Palermo	Oswego	41.1	35	38.2	−2.9	50.0	1878	32.4	1874
Ohio.									
Wauseon	Fulton	46.3	18	46.3	0.0	54.8	1878	38.6	1874
Oregon.									
Albany	Linn	50.8	10	53.5	+2.7	54.5	1881	40.9	1883
Eola	Polk	49.6	18	52.7	+3.1	.....	.....	.....	.....
Pennsylvania.									
Dyberry	Wayne	42.0	23	40.3	−1.7	50.5	1878	35.0	1874
Wellsborough	Tioga	42.8	10	42.1	−0.7	46.2	1880	38.2	1878
Tennessee.									
Milan	Gibson	60.0	6	63.0	+3.0	.....	.....	.....	.....
Texas.									
New Ulm	Austin	68.4	16	70.9	+2.5	71.4	78, '80	63.6	1875
Vermont.									
Strafford	Orange	40.7	14	37.9	−2.8	48.3	1886	35.7	1875
Virginia.									
Bird's Nest	Northampt'n	54.8	19	52.5	−2.3	61.6	1880	49.4	1875
Wytheville	Wythe	52.2	24	54.3	+2.1	56.0	1866	47.0	1881
Variety Mills	Nelson	53.8	11	53.1	−0.7	58.3	1878	51.2	1887
West Virginia.									
Helvetia	Randolph	48.4	12	48.1	−0.3	.....	.....	.....	.....

FROST.

Frosts, which were reported in some part of the country on every day during the month, occurred most extensively from the 10–13th; they were least extensively reported during the last three days of the month. The frosts of the 24th to 27th in Virginia caused much damage to garden truck in the southern part of the state. A statement from Norfolk on the 26th, which was extensively published in the newspapers, placed the damage done in that vicinity at half a million of dollars. In the Southern States and California frost occurred as follows:

Alabama.—Auburn, 12th, 21st; New Market, 13th, 14th, 21st, 22d, 24th, 25th.

Arkansas.—Eureka Springs, 13th; Lead Hill, 13th, 21st.

California.—Georgetown, 6th; Riverside, 5th; Sacramento, 1st, 5th, 7th, 26th; Willows, 1st, 2d.

Florida.—Archer, 15th.

Georgia.—Athens, 21st, 25th; Atlanta, 21st; Forsyth, 21st, 22d, 25th, 26th.

North Carolina.—Charlotte and Raleigh, 21st, 24th to 26th; Flat Rock, 25th, 26th; Lenoir, 13th, 14th, 24th, 25th; Statesville, 21st, 24th to 26th; Wash Woods, 17th, 26th; Weldon, 9th, 17th, 21st, 24th to 27th.

South Carolina.—Cedar Springs, 21st, 25th to 27th; Stateburg, 21st, 25th, 26th.

Tennessee.—Ashwood and Milan, 13th, 21st, 25th; Memphis, 21st; Nashville, 13th, 21st.

Texas.—Cleburne, Decatur, and Silver Falls, 30th.

Table of comparative maximum and minimum temperatures for April.

State or Territory.	Stations.	For 1888.		Since establishment of station.				Length of record.
		Max.	Min.	Max.	Year.	Min.	Year.	
		°	°	°		°		Yrs.
Alabama	Mobile	84.0	50.0	90.0	1883	32.0	1881	18
Do	Montgomery	86.6	44.0	90.0	1880	30.0	1881	16
Arizona	Prescott	78.5	31.3	86.0	1879	13.0	1878	12
Do	Fort Apache	83.0	30.0	89.0	1879	15.0	1883	10
Arkansas	Fort Smith	89.7	41.5	91.3	1887	30.0	1887	6
Do	Little Rock	86.0	43.0	94.0	1880	28.2	1886	9
California	San Francisco	87.7	46.0	81.0	1875	40.0	1875	18
Do	San Diego	93.0	47.0	87.0	1876	39.0	1875	17
Colorado	Denver	80.6	30.0	83.0	1874	4.0	1876	17
Do	Montrose	76.0	28.8	78.5	1887	18.5	1886	3
Connecticut	New Haven	77.5	25.4	83.0	1885	16.0	1874	16
Do	New London	68.0	27.5	79.4	1887	19.0	1874	17
Dakota	Fort Buford	82.2	3.5	92.0	1881	7.0	1880	10
Do	Yankton	84.8	24.2	90.1	1887	— 3.0	1881	16
Dis. of Columbia	WashingtonCity	89.0	31.8	90.0	1872	22.5	1875	18
Florida	Jacksonville	88.0	49.0	91.0	1880	37.0	1881	17
Do	Key West	82.5	64.5	91.0	1881	61.0	1873, 1881	18
Georgia	Atlanta	84.3	39.7	88.1	1887	25.0	1881	10
Do	Savannah	88.1	47.8	89.0	1873, 1887	33.0	1881	18
Idaho	Boisé City	88.1	25.0	86.3	1887	17.5	1883	11
Illinois	Cairo	82.5	40.0	89.0	1872	24.0	1875	17
Do	Chicago	83.0	30.0	83.0	1873	17.0	1881	16
Indiana	Indianapolis	83.3	30.9	85.3	1883	19.0	1875	16
Indian Ter	Fort Sill	92.2	36.5	96.0	1880	26.0	1881	10
Iowa	Dubuque	81.6	28.5	84.0	1879	13.8	1886	15
Do	Des Moines	79.6	21.4	89.0	1883	11.0	1881	10
Kansas	Dodge City	89.8	31.0	92.0	1880	13.0	1881	14
Do	Leavenworth	87.4	29.5	89.0	1880	13.0	1881	17
Kentucky	Louisville	84.8	32.5	88.5	1883	21.0	1875	16
Louisiana	New Orleans	85.0	56.3	86.8	1887	38.0	1881	18
Do	Shreveport	87.0	46.0	96.2	1887	32.0	1881	16
Maine	Eastport	55.6	12.9	71.3	1886	2.0	1874	16
Do	Portland	64.5	15.5	78.0	1881	14.0	1874	17
Maryland	Baltimore	90.0	32.8	87.8	1886	23.5	1875	16
Massachusetts	Boston	66.0	20.8	85.0	1872	11.0	1874	18
Michigan	Marquette	61.8	13.5	81.5	1887	3.0	1875	14
Do	Grand Haven	74.0	37.6	80.0	1883	9.0	1874	16
Minnesota	Saint Vincent	77.2	5.8	83.5	1887	—14.4	1874	8
Do	Saint Paul	76.0	22.6	84.2	1887	7.0	1874	16
Mississippi	Vicksburg	85.0	45.8	92.0	1887	31.0	1881	16
Missouri	Saint Louis	87.5	34.8	87.5	1883	22.0	1875	18
Montana	Ft. Assinaboine	80.0	15.1	81.0	1881	7.0	1881	8
Do	Helena	78.0	27.5	74.0	1887	6.0	1881	9
Nebraska	North Platte	88.9	26.2	93.2	1887	12.0	1875	14
Do	Omaha	86.5	28.0	89.0	1880	6.0	1881	16
Nevada	Winnemucca	83.2	21.0	81.1	1887	17.0	1883	9
New Jersey	Atlantic City	74.3	30.3	84.0	1887	19.0	1875	15
New Mexico	Santa Fé	72.5	29.0	84.0	1879	11.0	1875	16
New York	Buffalo	66.0	21.4	82.6	1883	11.0	1881	16
Do	New York City	84.2	29.2	84.0	1886	20.0	1874	17
North Carolina	Charlotte	91.0	38.3	89.3	1887	28.0	1881	10
Do	Wilmington	87.5	37.3	90.0	1880	28.0	1875	18
Ohio	Cincinnati	84.1	33.4	85.0	1872, 1873	18.0	1875	18
Do	Sandusky	85.1	28.1	83.9	1886	14.0	1881	10
Oregon	Portland	83.5	32.0	85.0	1880	28.0	1875	17
Do	Roseburg	83.8	29.0	84.5	1880	27.5	1887	11
Pennsylvania	Pittsburg	86.0	25.5	89.2	1885	14.0	1875	16
Do	Philadelphia	90.7	31.0	87.0	1872	17.5	1874	18
Rhode Island	Block Island	60.0	26.9	69.9	1885	25.0	1881	8
South Carolina	Charleston	88.0	50.0	87.0	1880	32.0	1881	16
Tennessee	Knoxville	84.8	35.5	88.7	1887	24.0	1875	18
Do	Memphis	86.5	43.0	88.0	1882, 1883	27.0	1881	16
Texas	Brownsville	84.1	60.9	97.8	1886	43.0	1881	13
Do	Fort Elliott	88.0	37.4	96.0	1880	20.0	1881	9

Table of comparative maximum and minimum temperatures, &c.—Cont'd.

State or Territory.	Stations.	For 1888.		Since establishment of station.				Length of record.
		Max.	Min.	Max.	Year.	Min.	Year.	
		°	°	°		°		
Utah	Salt Lake City	80.1	31.1	83.0	1874	19.0	1875	15
Virginia	Lynchburg	88.9	31.3	91.5	1873	25.0	1881	16
Do	Norfolk	93.1	32.2	92.0	1871	27.0	1875, 1880	18
Washington	Spokane Falls	79.9	27.3	86.2	1887	26.0	1887	8
Do	Olympia	78.8	31.0	82.0	1880	27.2	1887	11
Wisconsin	La Crosse	74.2	26.0	83.0	1879	10.0	1881	16
Do	Milwaukee	77.9	27.5	82.0	1871	11.6	1886	18
Wyoming	Cheyenne	76.3	24.6	80.0	1874	2.0	1875	16

TEMPERATURE OF WATER.

The following table shows the temperature of the sea-water for April, 1888, observed, under conditions as given, at the harbors of the several stations; the monthly range of water temperature; the average depth at which the observations were made, and the mean temperature of the air:

Station.	Temperature at bottom.				Mean temperature of air at the station.	Average depth of water in feet and tenths.
	Max.	Min.	Range.	Monthly mean.		
	°	°	°	°	°	
Canby, Fort, Wash						
Cedar Keys, Fla	79.2	71.0	8.2	75.4	70.6	8.1
Charleston, S. C	68.0	53.5	14.5	64.0	65.6	34.0
Eastport, Me	37.3	33.8	3.5	35.5	36.5	16.0
Galveston, Tex	76.0	65.4	10.6	73.7	71.2	14.7
Key West, Fla*	81.7	73.0	8.7	78.8	75.7	17.1
New York City	47.0	35.0	12.0	40.8	47.9	14.5
Pensacola, Fla	73.0	66.5	7.5	71.2	69.9	18.6
Portland, Me	40.0	33.8	6.2	36.9	39.2	15.6
Portland, Oregon	58.7	46.0	12.7	53.2	55.0	53.1

*No thermometer at station.

COTTON REGION REPORTS.

In the accompanying table are given for April, 1888, means of the maximum and minimum temperatures, and the average rainfall in the cotton regions, together with normals computed from similar observations of former years.

It will be seen that both the maximum and minimum temperatures were in general above the normal.

The rainfall was largely deficient in all districts, with the exception of the Galveston district, where there was a large excess.

Temperature and rainfall data for the cotton districts, April.

Districts.	Rainfall.			Temperature.							
				Maximum.			Minimum.			Extremes for April, 1888.	
	Average for April of three preceding years.	Average for April, 1888.	Departures.	Mean for April of three preceding years.	Mean for April, 1888.	Departures.	Mean for April of three preceding years.	Mean for April, 1888.	Departures.	Max.	Min.
	Inches	Inches	Inches.	°	°	°	°	°	°	°	°
New Orleans	6.05	1.60	— 4.45	79.1	80.6	+ 1.5	58.8	58.8	0.0	97	42
Savannah	4.20	0.37	— 3.83	79.7	82.1	+ 2.4	58.0	57.5	— 0.5	92	41
Charleston	3.47	1.11	— 2.36	75.9	79.3	+ 3.4	53.3	56.1	+ 2.8	91	37
Atlanta	5.32	1.44	— 3.88	73.7	77.1	+ 3.4	51.3	53.2	+ 1.9	93	37
Wilmington	4.00	1.27	— 2.73	71.6	76.0	+ 4.4	48.5	49.9	+ 1.4	95	30
Memphis	6.07	3.02	— 3.05	73.0	75.1	+ 2.1	52.0	53.1	+ 1.1	86	38
Galveston	2.67	7.16	+ 4.49	79.0	77.9	— 1.1	55.7	62.2	+ 6.5	86	42
Vicksburg	6.49	1.41	— 5.08	73.7	80.8	+ 7.1	55.5	58.5	+ 3.0	88	46
Montgomery	5.76	1.45	— 4.31	77.1	80.5	+ 3.4	53.5	56.0	+ 2.5	89	40
Augusta	4.70	0.91	— 3.79	75.3	78.4	+ 3.1	52.5	53.7	+ 1.2	91	35
Little Rock	6.06	2.64	— 3.42	74.5	77.3	+ 2.8	51.0	54.1	+ 3.1	91	30
Mobile	6.75	1.77	— 4.98	78.6	80.9	+ 2.3	55.7	54.5	— 1.2	92	40

PRECIPITATION (expressed in inches and hundredths).

The distribution of precipitation over the United States and Canada for April, 1888, as determined from the reports of about one thousand stations, is exhibited on chart iv. In the table of miscellaneous meteorological data are given, for each Signal Service station, the total precipitation, with the departures from the normal. The figures opposite the names of the

geographical districts in columns for mean temperature, precipitation, and departures from the normal, show respectively the average for the several districts. The normal for any district may be found by adding the departure to the current mean when the precipitation is below the normal, and subtracting when above.

From chart iv it will be seen that the heaviest rainfall of the month occurred in the lower Rio Grande valley and in portions of the central and southern Rocky Mountain slopes and west Gulf states. Comparison with the averages for past years shows very large percentages of excess in the Rio Grande Valley and southern slope, and quite a marked excess in the middle slope and west Gulf states. In the upper lake region there was a slight excess and in the eastern Canadian provinces there was also a slight, but general, excess over the average rainfall. The rainfall in the lower Rio Grande valley was about three times as great as the average, and that in the southern slope was slightly more than double the average. The most noteworthy feature of the month's rainfall, however, is the extended area of deficiency, which constitutes much the greater part of the United States. In the extreme northwest and in the Atlantic coast states southward of Virginia the rainfall amounted to about one-third of the April average; on the north Pacific coast, in the Missouri and Ohio valleys, and on the Atlantic coast from Virginia northward slightly less than two-thirds of average amount of rain fell; and in Montana, the upper Mississippi valley, and lower lake region the monthly rainfall amounted to about three-fourths of the April average. The most marked deficiency occurred in California, where the normal April rainfall ranges from about 1.60 in the southern part of the state to nearly 3.00 in the northern part; the rainfall in this state for April of the current year has amounted to less than 10 per cent. of the normal.

HAIL.

Hail is reported to have fallen as follows: 1st, Conn., Ill., Mont., N. Y., Ohio, Pa., Wash. 2d, Ala., Ohio, Pa., Tenn. 3d, Cal., Ga., Ill. 4th, Iowa, Minn., Mont., Oregon, Tenn., Wash. 5th, Dak., Ill., Iowa, Mich., Ohio, W. Va., Wis. 6th, Pa., Tenn. 7th, Iowa, Kans. 8th, Ariz., Ill., Iowa, Kans., N. Mex., Tex. 9th, Dak., Ind. T. 10th, N. Mex., Pa. 11th, La., Miss., N. Mex., N. Y., Tex. 12th, Pa., W. Va. 13th, Mich. 14th, W. Va., Wis. 15th, Ill., Ohio, W. Va. 16th, Colo., Minn., Nebr., N. J., W. Va., Wis. 17th, Ala., Colo., Ill., Kans., Mich., Minn., N. Mex., W. Va., Wis. 18th, Ohio, S. C. 19th, Fla., N. C. 20th, N. J. 21st, Ariz., Conn., Mass., R. I., W. Va. 22d, Ala., Conn., Me., Oregon. 23d, Ala., Ariz., Conn., La., N. Mex., Oregon, R. I. 24th, Conn., Oregon. 25th, Cal., Minn., Nebr., Oregon, Wyo. 26th, Colo., Dak., Iowa, Kans., Minn., N. Mex., Wyo. 27th, Idaho, Nebr., N. Mex., Oregon. 28th, Oregon, Tex., Wis. 29th, W. Va., Wis. 30th, Cal., W. Va., Wis.

SNOW.

During the month snow fell on but few dates southward of the fortieth parallel, except in the Rocky Mountain regions and in West Virginia. Northward of the fortieth parallel it fell on numerous dates, increasing gradually from ten days in Wisconsin to twenty-two in Maine. The most southerly stations, with altitudes below 2,000 feet above sea-level, that reported snow are located in New Jersey and southern Pennsylvania, where it occurred on the 16th and 17th.

MONTHLY SNOWFALLS (in inches and tenths).

Monthly snowfalls of five inches, or more, occurred as follows; in states having less than five inches the maximum amount is given:

California: Fort Bidwell, 1. *Colorado:* Pike's Peak, 23.2; Georgetown, 6. *Connecticut:* New Hartford and New London, trace. *Dakota:* Fort Buford, 6.8; Parkston, 6. *Illinois:* Riley, 3. *Iowa:* Clear Lake, 1.5. *Maine:* Cornish, 21; Kent's Hill, 19; Orono, 16; Eastport, 15.8; Bar Harbor, 9; Gardiner, 8.5. *Massachusetts:* Dudley, 5. *Michigan:* Marquette, 12.6; Mio and West Branch, 10; Maple Hill, 9.4; East Tawas, 8.1; Alpena, 7.7; Harrisville and Traverse City, 6.5. *Minnesota:* Saint Vincent, 3.1. *Montana:* Fort Maginnis, 6.8. *Nebraska:* North Loup, 7. *Nevada:* Carson City, 1.8. *New Hampshire:* Berlin Mills, 11.5; Concord, 8; Antrim, 7; Manchester, 6.9. *New Jersey:* Beverly, 1. *New Mexico:* Santa Fé, 0.5. *New York:* Humphrey, 7.2; Utica, 5. *Ohio:* Westerville and North Lewisburg, 1. *Pennsylvania:* Reading, 8.5; Dyberry, 6.5; Wellsborough, 6. *Utah:* Salt Lake City, 2.3. *Vermont:* Strafford, 29; Middlebury, 27.2; Northfield, 14.4; Manchester, 9; Saint Johnsbury, 8; Lunenburg, 7.5. *West Virginia:* Middlebrook, 3.5. *Wisconsin:* Fredonia, 4. *Wyoming:* Fort Bridger, 4.6.

DEVIATIONS FROM AVERAGE PRECIPITATION.

The following table shows for certain stations, as reported by voluntary observers, (1) the average precipitation for a series of years; (2) the length of record during which the observations have been taken, and from which the average has been computed; (3) the total precipitation for April, 1888; (4) the departures of the current month from the average; (5) and the extreme monthly precipitation for April during the period of observations and the year of occurrence:

State and station.	County.	(1) Average for the month of April.	(2) Length of record.	(3) Total for April, 1888.	(4) Departure from average.	(5) Extreme monthly precipitation for April.			
						Greatest.		Least.	
						Am't.	Year.	Am't.	Year.
Arkansas.		*Inches*	*Years*	*Inches*	*Inches.*	*Inches*		*Inches.*	
Lead Hill	Boone	4.68	7	1.98	−2.70	6.61	1882	1.98	1888
Washington	Hempstead	5.47	20	6.62	+1.15				
California.									
Sacramento	Sacramento	1.98	22	0.10	−1.88	11.97	1880	Trace.	1875
Salinas	Monterey	1.33	16	0.00	−1.33				
Florida.									
Merritt's Island	Brevard	4.22	11	1.69	−2.53	9.74	1878	0.53	1885
Illinois.									
Riley	McHenry	2.70	27	2.16	−0.54				
Sandwich	DeKalb	3.35	36	1.70	−1.65				
Indiana.									
Logansport	Cass	3.15	34	3.33	+0.18	7.30	1864		
Vevay	Switzerland	3.40	31	1.90	−1.50	7.18	1872	0.98	1882
Spiceland	Henry	3.20	28	2.16	−1.04	7.30	1862	0.80	1867
Iowa.									
Independence	Buchanan	2.06	12	2.53	+0.47	4.10	1882	0.70	1879
Cresco	Howard	2.12	15	3.68	+1.56	3.68	1888		
Monticello	Jones	2.56	34	1.50	−1.06	5.78	1862	0.63	1863
Kansas.									
Lawrence	Douglas	3.16	20	2.58	−0.58	5.62	1884	1.08	1870
Wellington	Sumner	3.28	10	6.49	+3.21	6.49	1888	0.54	1880
Independence	Montgomery	3.67	16	6.37	+2.70	6.37	1888	1.64	1885
Louisiana.									
Grand Coteau	Saint Landry	4.88	6	2.68	−2.20	8.03	1886	1.77	1887
Point Pleasant	Tensas	9.73	12	1.75	−7.98				
Maine.									
Gardiner	Kennebec	3.42	50	2.27	−1.15	6.81	1887	0.65	1844
Maryland.									
Cumberland	Alleghany	2.16	16	3.56	+0.40	4.53	1882	0.60	1879
Massachusetts.									
Somerset	Bristol	3.97	18	2.17	−1.80				
Worcester	Worcester	3.58	50	3.23	−0.35				
Michigan.									
Thornville	Lapeer	2.35	12	1.57	−0.78				
Kalamazoo	Kalamazoo	2.63	13	1.07	−1.56				
Adrian	Lenawee	2.78	11	3.31	+0.53				
Nevada.									
Carson City	Ormsby	1.28	9	0.20	−1.08	5.02	1880	0.12	1881
New Jersey.									
South Orange	Essex	2.98	18	4.10	+1.12	7.52	1874	0.85	1881
New York.									
Palermo	Oswego	2.30	35	2.30	0.00	7.00	1859	0.26	1879
Ohio.									
Wauseon	Fulton	2.46	15	2.27	−0.19	4.81	1880	1.31	1872
Oregon.									
Albany	Linn	3.39	10	1.40	−1.99	6.58	1883	1.38	1885
Eola	Polk	3.09	18	0.89	−2.20				
Pennsylvania.									
Dyberry	Wayne	2.46	19	2.98	+0.52	5.06	1874	0.80	1882
Wellsborough	Tioga	3.80	10	2.49	−1.31	5.30	1884	2.10	?
South Carolina.									
Kirkwood	Kershaw	3.08	22	1.26	−1.82			1.05	1872
Stateburg	Sumter	2.53	8	0.83	−1.70	4.17	1883	0.83	1888
Tennessee.									
Milan	Gibson	4.48	6	2.45	−2.03	9.58	1883	1.38	1887
Texas.									
New Ulm	Austin	3.84	16	3.76	−0.08	8.00	1873	0.17	1887
Virginia.									
Bird's Nest	Northampton	3.33	19	4.10	+0.77	6.65	1883	1.10	1869
Wytheville	Wythe	3.49	24	1.35	−2.14	6.50	1862	0.80	1876
Vermont.									
Strafford	Orange	2.37	14	3.00	+0.63	5.20	1878	0.60	1881
West Virginia.									
Helvetia	Randolph	4.01	12	2.61	−1.40				

DEPTH OF UNMELTED SNOW ON GROUND AT END OF MONTH.

[*Expressed in inches and tenths.*]

Snow on the ground at the close of April was reported as follows: *Dakota:* Parkston, trace. *Maine:* Cornish, 12. *Michigan:* Marquette, 10; Maple Hill, 7; Big Rapids, 3; Alpena, 2.8; Harrisville and West Branch, 2; Bear Lake, 1.5; Alma and Grand Haven, trace. *Minnesota:* Duluth, trace. *Montana:* Virginia City, 0.5. *Vermont:* Strafford, 12; Manchester, trace. *Wisconsin:* Manitowoc and Milwaukee, trace.

SLEET.

Sleet fell during April on the several dates as follows: 1st, Dak., N. Y., Ohio, Pa.; 2d, N. Y.; 3d, Cal.; 8th, Wis.; 10th, Conn., Mass.; 11th, Me.; 13th, Mich., Wis.; 14th, N. Y.; 15th and 16th, Wis.; 17th, Mich., Wis., Wyo.; 18th, Ind., Iowa, Mich.; 19th, Iowa, Ohio; 21st, Me.; 26th, Mont.; 28th, Mich., Minn., N. Mex.; 29th, Dak., Wis.; 30th, Wis.

PRECIPITATION FROM A CLOUDLESS SKY.

Mr. T. C. Harris, voluntary observer, Raleigh, N. C., reports: "On April 3d, 9.30 p. m., a brisk sprinkle of rain (about 0.01 inch) fell from a clear sky; stars were shining brightly at the time; cloud visible low down on the horizon in the west. The phenomenon was noticed by many persons."

EXCESSIVE PRECIPITATION IN APRIL.

Table showing for the month of April monthly rainfalls of 10 inches, or more (in states where monthly rainfalls did not reach 10 inches the station reporting the maximum amount is given); rainfalls of 2.50 inches, or more, in any 24 consecutive hours; and rainfalls equaling or exceeding one inch in one hour.

States and stations.	Rainfall of 10 inches, or more, per month.		Rainfall of 2.50 inches, or more, in 24 hours.			Rainfall equaling or exceeding one inch per hour.			
	Year.	Amt.	Year.	Day.	Amt.	Year.	Day.	Time	Amt.
Alabama.		*Inches.*			*Inches*			*h. m.*	*Inches*
Carrollton			1887	22	2.88				
Green Springs			1878	23	2.50				
Do			1880	20	3.82				
Mobile	1874	10.92	1875	1–2	3.39	1872	21	0 40	1.11
Do			1881	24	5.34	1888	23	1 00	2.60
Do			1882	19	7.30				
Do			1883	9	2.59				
Do			1888	23	3.74				
Montgomery	1876	10.99	1876	2	5.97				
Do	1877	10.36	1877	7–8	4.65				
Do			1877	28	3.10				
Do			1879	16	2.52				
Do			1882	19	2.71				
Do			1883	9	3.41				
Do			1886	26	3.66				
New Market			1888	30	2.63				
Arizona.									
Prescott	1878	2.86							
Arkansas.									
Fort Smith			1885	21–22	4.30	1883	13	1 00	1.45
Do			1886	25	2.61				
Do			1888	28	3.40				
Little Rock	1884	10.24	1883	5–6	4.57	1880	19	1 00	1.10
Do			1884	14	2.99	1882	6	0 30	1.50
Do			1884	18	2.83	1882	28	0 30	1.03
Do						1883	5	1 00	1.10
Pine Bluff			1888	10	3.00				
California.									
Foust City			1880	20–21	6.54				
Georgetown			1880	21	4.00				
Grass Valley			1880	20–21	4.50				
Healdsburg			1880	20–21	9.73				
Modesto			1880	20–21	7.00				
Mount Saint Helena			1880	20–21	14.70				
Nevada City			1880	21	5.20				
Sacramento	1880	14.20	1880	20	5.28				
Do			1880	21	3.09				
San Francisco	1080	10.06							
Santa Rosa			1880	20–21	6.70				
Tomales			1880	20–21	5.02				
Colorado.									
Denver			1885	22–23	2.77				
Pike's Peak	1879	12.15	1879	13–14	3.28				
Do			1879	20–21	3.23				
Do			1885	22–23	3.42				
Connecticut.									
New Haven			1876	3–4	5.90				
Do			1879	17–18	2.50				
New London	1874	10.85	1876	3–4	4.74				
Southington			1878	29	2.50				
Dakota.									
Deadwood	1878	8.77	1877	16	2.52				
Do			1878	17	3.20				
Do			1879	21–22	2.86				
Do			1880	22–23	3.32				
Fort Sully			1886	24–25	2.74				
Yankton			1875	6–7	4.60				

Table showing for the month of April, &c.—Continued.

States and stations.	Rainfall of 10 inches, or more, per month.		Rainfall of 2.50 inches, or more, in 24 hours.			Rainfall equaling or exceeding one inch per hour.			
	Year.	Amt.	Year.	Day.	Amt.	Year.	Day.	Time	Amt.
Delaware.		*Inches.*			*Inches*			*h. m.*	*Inches*
Cape Henlopen	1887	2.63							
District of Columbia.									
Washington City	1874	5.65							
Florida.									
Cedar Keys			1878	24	3.79				
Daytona						1879	9	1 00	1.70
Do						1880	29	0 45	1.02
Fort Barrancas	1874	10.11	1878	8	2.75				
Do	1879	14.28	1878	23	3.48				
Do			1879	14	3.05				
Do			1880	16	2.24				
Do			1885	2–3	4.32				
Do			1885	7–8	3.63				
Jacksonville			1876	2–3	4.70	1881	23	1 10	1.07
Do						1883	23	0 20	*1.50
Key West			1882	3–4	3.23				
Pensacola			1880	16	2.30				
Do			1881	24	2.73				
Do			1885	8	2.69				
Do			1886	18	2.84				
Saint Marks			1878	15	3.69				
Do			1879	14–15	5.15				
Titusville						1888	19	0 25	1.78
Georgia.									
Atlanta			1883	9	3.08	1883	23	1 00	1.44
Do			1884	14–15	3.76				
Augusta			1874	16–17	2.74				
Do			1876	1–2	2.82				
Do			1877	12–13	2.91				
Do			1882	22–23	3.26				
Do			1883	9–10	2.66				
Do			1883	23	2.53				
Savannah	1877	8.82	1873	29	2.98				
Do			1876	1–2	2.63				
Do			1877	12–13	2.52				
Do			1878	9	3.52				
Do			1879	16–17	6.11				
Do			1883	30†	3.21				
Tybee Island			1878	9	4.36				
Idaho.									
Eagle Rock	1882	3.35							
Illinois.									
Cairo	1874	7.57	1872	13	2.50				
Griggsville			1883	22	3.20				
Hennepin			1878	28	2.60				
Mount Sterling			1878	19	3.00	1878	19	2 00	3.00
Peoria						1873	5	1 05	1.13
Indiana.									
Blue Lick			1887	22	3.36				
Indianapolis	1880	6.43	1888	9–10	2.00				
Marengo			1887	22	6.77?				
New Corrydon			1880	23	3.79				
Vevay			1878	10	2.80				
Do			1880	25	2.20				
Do			1887	22	3.67				
Indian Territory.									
Eufaula			1888	28	3.80				
Fort Arbuckle			1860	20	6.00				
Do			1870	26	3.03				
Fort Gibson	1875	8.74	1875	30†	4.67				
Fort Sill			1879	21–22	6.46				
Tulsa			1888	28	3.20				
Woodward			1888	8	3.04				
Iowa.									
Bancroft			1888	26–27	2.82				
Davenport			1876	11–12	3.32				
Denmark						1882	8	0 30	1.87
Dubuque			1882	18–19	2.60				
Keokuk	1873	5.65							
Newton			1880	23	3.90				
Smithland			1878	9	2.60				
Sac City			1888	26–27	3.44				
West Bend			1888	4–5	3.00				
Kansas.									
Baxter Springs			1878	22	3.10				
Empire City			1878	22	2.75				
Grainfield			1888	27	5.00				
Independence			1888	8	2.70				
Leavenworth			1877	18–19	3.16				
McAllaster	1888	10.20	1888	26	4.00				
Do			1888	27	3.40				
Do			1888	28	2.50				
Manhattan						1885	29	1 00	1.23
Oakley			1888	27–28	3.00				
Tribune			1888	26–27	2.50				
Wellington			1888	8	3.50				
Kentucky.									
Louisville	1872	9.08	1872	8	3.56				
Do			1880	15	2.28				
Do			1883	5–6	3.64				
Do			1887	17–18	2.60				
Do			1887	22	2.66				
Shelbyville			1888	9	2.70				
Louisiana.									
New Orleans	1874	13.62	1875	20–21	2.90	1879	16	2 20	2.82
Do	1883	14.20	1876	7	5.51				
Do			1879	16	2.82				
Do			1880	20	3.18				
Do			1883	7–8	9.22				
Do			1884	4–5	2.96				
Do			1886	27–28	2.67				

Table showing for the month of April, &c.—Continued.

States and stations.	Rainfall of 10 inches, or more, per month.		Rainfall of 2.50 inches or more, in 24 hours.			Rainfall equaling or exceeding one inch per hour.			
	Year.	Amt.	Year.	Day.	Amt.	Year.	Day.	Time.	Amt.
Louisiana—Continued.		*Inches.*			*Inches*			*h. m.*	*Inches*
Okaloosa	.....	.....	1879	16	2.60	.....	....	.....	.....
Point Pleasant	.....	.....	1880	8	3.01	.....	....	.....	.....
Do	.....	.....	1880	15	4.01	.....	....	.....	.....
Do	.....	.....	1885	2	6.02	.....	....	.....	.....
Do	.....	.....	1885	5	12.28	.....	....	.....	.....
Shreveport	1874	10.64	1878	15	2.92	.....	....	.....	.....
Do	1879	10.23	1879	15	4.64	.....	....	.....	.....
Do	.....	.....	1879	23	3.11	.....	....	.....	.....
Do	.....	.....	1885	22	3.50	.....	....	.....	.....
Maine.									
Eastport	1884	6.83	.....	.....	.....	.....	....	.....	.....
Portland	.....	.....	1884	15-16	3.60	.....	....	.....	.....
Maryland.									
Baltimore	1874	6.65	.....	.....	.....	.....	....	.....	.....
Massachusetts.									
Thatcher's Island	.....	.....	1880	4	2.66	.....	....	.....	.....
Wood's Holl	1874	9.32	.....	.....	.....	.....	....	.....	.....
Michigan.									
Adrian	.....	.....	.....	.....	.....	1888	5	0 10	*1.50
Grand Haven	1880	6.48	.....	.....	.....	.....	....	.....	.....
Grand Rapids	.....	.....	1878	24	2.61	.....	....	.....	.....
Minnesota.									
Breckenridge	1878	7.77	1878	10-11	5.12	.....	....	.....	.....
Fort Snelling	.....	.....	1888	26	2.71	.....	....	.....	.....
Mississippi.									
Brook Haven	1876	20.35	1874	8	3.30	.....	....	.....	.....
Do	1877	12.00	1874	15-16	4.40	.....	....	.....	.....
Do	.....	.....	1874	17-19	7.45	.....	....	.....	.....
Do	.....	.....	1875	8-9	3.80	.....	....	.....	.....
Do	.....	.....	1876	1	3.20	.....	....	.....	.....
Do	.....	.....	1877	27	3.40	.....	....	.....	.....
Coleman	1874	19.60	.....	.....	.....	.....	....	.....	.....
Fayette	1874	14.20	1874	3	2.60	.....	....	.....	.....
Do	1877	10.30	1874	7	3.50	.....	....	.....	.....
Do	1880	13.00	1878	8	2.50	.....	....	.....	.....
Do	.....	.....	1878	23	2.70	.....	....	.....	.....
Do	.....	.....	1880	15-16	9.00	.....	....	.....	.....
Grenada	1874	18.50	1869	19	2.60	.....	....	.....	.....
Jackson	1874	23.80	.....	.....	.....	.....	....	.....	.....
Ship Island	.....	.....	1868	6	2.50	.....	....	.....	.....
Do	.....	.....	1886	17-18	3.80	.....	....	.....	.....
Vicksburg	1868	13.01	1868	6	3.00	1874	15	3 45	3.40
Do	.....	.....	1869	25	2.60	.....	....	.....	.....
Do	.....	.....	1869	27	2.70	.....	....	.....	.....
Do	.....	.....	1872	2-3	2.61	.....	....	.....	.....
Do	.....	.....	1872	5-6	3.33	.....	....	.....	.....
Do	.....	.....	1874	8	4.40	.....	....	.....	.....
Do	.....	.....	1874	15	4.18	.....	....	.....	.....
Do	.....	.....	1874	18-19	4.86	.....	....	.....	.....
Do	.....	.....	1875	9-10	2.63	.....	....	.....	.....
Do	.....	.....	1877	7-8	3.53	.....	....	.....	.....
Do	.....	.....	1878	23	2.63	.....	....	.....	.....
Do	.....	.....	1880	8	3.09	.....	....	.....	.....
Do	.....	.....	1883	6	4.25	.....	....	.....	.....
Do	.....	.....	1885	6-7	4.29	.....	....	.....	.....
Do	.....	.....	1886	27-28	2.79	.....	....	.....	.....
Missouri.									
Saint Louis	1873	6.87	1850	16	2.53	.....	....	.....	.....
Do	.....	.....	1856	26	3.84	.....	....	.....	.....
Do	.....	.....	1868	14	3.42	.....	....	.....	.....
Do	.....	.....	1873	7-8	3.15	.....	....	.....	.....
Do	.....	.....	1878	22-23	3.88	.....	....	.....	.....
Do	.....	.....	1881	6-7	2.62	.....	....	.....	.....
Montana.									
Fort Ellis	.....	.....	1879	20-21	2.60	.....	....	.....	.....
Virginia City	1880	3.87	.....	.....	.....	.....	....	.....	.....
Nebraska.									
North Platte	.....	.....	1875	26	2.74	.....	....	.....	.....
Omaha	1885	6.34	1883	17	2.55	1883	14	1 00	1.00
Nevada.									
Winnemucca	1887	1.94	.....	.....	.....	.....	....	.....	.....
New Hampshire.									
Mount Washington	1878	23.41	.....	.....	.....	.....	....	.....	.....
Do	1882	11.20	.....	.....	.....	.....	....	.....	.....
New Jersey.									
Lambertville	.....	.....	1863	15-16	2.60	.....	....	.....	.....
Long Branch	1874	11.37	.....	.....	.....	.....	....	.....	.....
Sandy Hook	1874	12.55	.....	.....	.....	.....	....	.....	.....
New Mexico.									
Santa Fé	1877	1.83	.....	.....	.....	.....	....	.....	.....
New York.									
New York City	1874	7.02	1886	5-6	3.72	.....	....	.....	.....
North Carolina.									
Cape Lookout	1877	10.65	.....	.....	.....	.....	....	.....	.....
Charlotte	.....	.....	1884	21-22	2.94	1885	5	0 35	1.00
Ellsworth	.....	.....	1880	4	2.50	.....	....	.....	.....
Do	.....	.....	1880	29	3.50	.....	....	.....	.....
Fayetteville	.....	.....	1879	27-28	6.25	.....	....	.....	.....
Greenville	.....	.....	1878	11	3.00	.....	....	.....	.....
Hatteras	1877	11.07	1875	3	4.62	1877	8	1 00	1.00
Do	.....	.....	1877	13-14	3.75	1877	13	1 00	1.00
Do	.....	.....	1878	10	2.83	.....	....	.....	.....
Do	.....	.....	1881	14	4.53	.....	....	.....	.....
Do	.....	.....	1883	23	3.21	.....	....	.....	.....
Highlands	.....	.....	1878	9	3.00	.....	....	.....	.....
Do	.....	.....	1880	29	2.60	.....	....	.....	.....
Mount Pleasant	.....	.....	1888	18-19	2.61	.....	....	.....	.....
Murphy	.....	.....	1876	13-14	4.30	.....	....	.....	.....
Portsmouth	1883	13.16	.....	.....	.....	.....	....	.....	.....
Wilmington	.....	.....	1877	13	2.64	.....	....	.....	.....

Table showing for the month of April, &c.—Continued.

States and stations.	Rainfall of 10 inches, or more, per month.		Rainfall of 2.50 inches, or more, in 24 hours.			Rainfall equaling or exceeding one inch per hour.			
	Year.	Amt.	Year.	Day.	Amt.	Year.	Day.	Time.	Amt.
Ohio.		*Inches.*			*Inches*			*h. m.*	*Inches*
Cincinnati	1887	5.86	.....	.....	.....	.....	....	.....	.....
North Lewisburg	.....	.....	1880	23	3.10	.....	....	.....	.....
Portsmouth	.....	.....	1840	29	2.90	.....	....	.....	.....
Oregon.									
Portland	1883	7.88	.....	.....	.....	.....	....	.....	.....
Pennsylvania.									
Newtown	.....	.....	1840	12	3.78	.....	....	.....	.....
Do	.....	.....	1840	29	3.28	.....	....	.....	.....
Philadelphia	1874	9.76	.....	.....	.....	.....	....	.....	.....
Pittsburg	.....	.....	1887	28-29	2.56	1886	26	0 34	1.50
Do	.....	.....	.....	.....	.....	1887	28	1 00	1.00
Rhode Island.									
Newport	1878	6.87	.....	.....	.....	.....	....	.....	.....
Fort Adams	.....	.....	1863	16-17	4.00	.....	....	.....	.....
South Carolina.									
Aiken	.....	.....	1879	16	3.60	.....	....	.....	.....
Charleston	.....	.....	1878	9	5.26	1875	11	1 00	1.24
Do	.....	.....	1879	16-17	5.09	.....	....	.....	.....
Tennessee.									
Chattanooga	1880	10.37	1880	3	3.09	.....	....	.....	.....
Do	.....	.....	1882	22-23	3.01	.....	....	.....	.....
Do	.....	.....	1883	22-23	2.55	.....	....	.....	.....
Do	.....	.....	1884	14-15	2.62	.....	....	.....	.....
Do	.....	.....	1887	22	2.36	.....	....	.....	.....
Knoxville	.....	.....	1874	15-16	4.23	1871	19	1 00	1.10
Do	.....	.....	1883	22	3.03	1883	22	1 00	1.00
Do	.....	.....	1886	4-5	2.90	.....	....	.....	.....
McMinnville	.....	.....	1878	23	2.60	.....	....	.....	.....
Memphis	1874	10.16	1872	8	2.95	1880	19	1 00	1.00
Do	1878	11.93	1873	30†	2.72	.....	....	.....	.....
Do	.....	.....	1874	15	3.60	.....	....	.....	.....
Do	.....	.....	1877	1	2.59	.....	....	.....	.....
Do	.....	.....	1877	17-18	2.59	.....	....	.....	.....
Do	.....	.....	1877	26-27	3.35	.....	....	.....	.....
Do	.....	.....	1878	23	3.98	.....	....	.....	.....
Do	.....	.....	1884	13-14	3.02	.....	....	.....	.....
Nashville	1874	11.84	1872	8	3.45	.....	....	.....	.....
Do	.....	.....	1878	23	2.95	.....	....	.....	.....
Do	.....	.....	1883	21-22	5.04	.....	....	.....	.....
Do	.....	.....	1888	9	3.13	.....	....	.....	.....
Parksville	.....	.....	1887	22	2.47	.....	....	.....	.....
Texas.									
Austin	.....	.....	1879	22-23	4.40	.....	....	.....	.....
Clarksville	1877	10.25	1879	22-23	5.50	.....	....	.....	.....
Comanche	.....	.....	1888	25	2.50	.....	....	.....	.....
Corsicana	1879	11.50	1879	22	6.31	1879	22	4 00	6.31
Do	.....	.....	1879	23	3.31	.....	....	.....	.....
Do	.....	.....	1880	7	2.79	.....	....	.....	.....
Dallas	.....	.....	1888	27	5.00	.....	....	.....	.....
Fort Elliott	.....	.....	.....	.....	.....	1885	20	1 00	1.08
Gallinas	.....	.....	1888	28	2.60	.....	....	.....	.....
Galveston	.....	.....	1872	2	3.25	1875	29	1 00	1.38
Do	.....	.....	1877	25	2.66	.....	....	.....	.....
Do	.....	.....	1878	8	3.27	.....	....	.....	.....
Do	.....	.....	1881	25-26	3.20	.....	....	.....	.....
Do	.....	.....	1884	4-5	2.53	.....	....	.....	.....
Do	.....	.....	1885	22-23	2.68	.....	....	.....	.....
Hearne	.....	.....	1888	29	3.50	.....	....	.....	.....
Indianola	.....	.....	1878	7	2.73	.....	....	.....	.....
Longview	.....	.....	1888	29	3.40	.....	....	.....	.....
Melissa	1879	10.09	1876	7	3.00	.....	....	.....	.....
Do	.....	.....	1877	17	5.00	.....	....	.....	.....
Do	.....	.....	1879	22-23	8.00	.....	....	.....	.....
New Ulm	.....	.....	1879	23-24	5.12	.....	....	.....	.....
Palestine	.....	.....	1884	18-19	3.01	1888	28	1 00	1.12
Do	.....	.....	1888	28-29	4.45	.....	....	.....	.....
Pilot Point	.....	.....	1879	28	3.00	1879	28	0 45	3.00
Rio Grande City	.....	.....	.....	.....	.....	1881	30	0 55	1.24
San Antonio	.....	.....	1880	28	2.79	1885	22	1 00	1 00
Do	.....	.....	1888	18	2.50	.....	....	.....	.....
Santa Maria	.....	.....	1888	19-20	7.34	.....	....	.....	.....
Sour Lake	.....	.....	1888	24	2.75	.....	....	.....	.....
Terrell	1879	19.75	.....	.....	.....	.....	....	.....	.....
Weatherford	.....	.....	1888	27-28	5.00	.....	....	.....	.....
Utah.									
Salt Lake City	1886	4.43	.....	.....	.....	.....	....	.....	.....
Vermont.									
Burlington	1874	3.19	.....	.....	.....	.....	....	.....	.....
Virginia.									
Cape Henry	.....	.....	1878	4	2.53	.....	....	.....	.....
Do	.....	.....	1878	25	2.50	.....	....	.....	.....
Norfolk	1877	9.98	1877	9-10	4.63	.....	....	.....	.....
Do	.....	.....	1883	16-17	5.19	.....	....	.....	.....
Washington.									
Olympia	1883	10.78	.....	.....	.....	.....	....	.....	.....
West Virginia.									
Morgantown	1874	7.20	.....	.....	.....	.....	....	.....	.....
Wisconsin.									
Milwaukee	1877	6.99	.....	.....	.....	.....	....	.....	.....
Wautoma	.....	.....	1878	21	3.00	.....	....	.....	.....
Wyoming.									
Hat Creek	1879	6.93	1879	21-23	6.74	.....	....	.....	.....

* Estimated. † To May 1st. ‡ In one day.

The sections of country subjected to excessive monthly rainfalls in April, as shown by the meteorological records of the Signal Service, are, with the exception of the Pacific coast

(where this month has been nearly free from such rainfalls), practically the same as those in which excessive rainfalls have occurred in preceding months, discussions of which have been given in the MONTHLY WEATHER REVIEW. It appears, however, that monthly rainfalls of ten inches, or more, have been less frequent in April than in March, especially on the north Pacific coast, where the April records show but one instance of a monthly rainfall amounting to as much as 10 inches, viz., 10.78 at Olympia, Wash., in 1883, and while this limit has not been reached on the central Pacific coast in March, it has been exceeded in April (1880) at both San Francisco and Sacramento, the latter station reporting 14.20. The records of but three stations show April rainfalls in excess of 20 inches, as follows: Brookhaven, Miss., 20.35, in 1874; on the summit of Mount Washington, N. H., 23.41, in 1878; and Jackson, Miss., 23.80, in 1876.

Daily rainfalls in April of 2.50 inches, or more, appear to have occurred with more frequency and over a larger extent of country than in the previous month. This statement, however, does not apply to the east Gulf coast, where they were more frequent at some stations in March than in April. At Vicksburg, Miss., daily rainfalls in April reaching the amount stated have been recorded fifteen times during the past twenty-one years; but of these two occurred in 1869, two in 1872, and three in 1874, there being ten years in which they did not occur. At Galveston, Tex., where the March records gave but one such daily rainfall those for April show six. At Louisville, Ky., the records show five daily rainfalls under this heading for April, while none have occurred at that station in March, and at Saint Louis, Mo., where but two occurred in March six have occurred in April. Remarkably heavy rains fell in portions of central California, April 20–21, 1880, and during the storm on the dates mentioned measurements of from three to fourteen inches were made at a number of stations, but in no other year do the records show similar rainfalls for that region. The largest amount given for any one day is that reported from Point Pleasant, La., viz., 12.28 inches for April 5, 1885.

As in the months previously considered hourly rainfalls amounting to, or exceeding, one inch have seldom occurred, and the stations reporting same are generally widely separated, being confined for the most part to the Southern States. Since the Signal Office at Little Rock was established, in 1880, four measurements of hourly rainfall in excess of 1.00 inch have been recorded, and of these two occurred in 1882; this station shows the maximum number, notwithstanding that the records at many other stations in the South are twice as long. It would, therefore, seem that these excessive rainfalls occur in the vicinity of Little Rock with uncommon frequency in April.

From the data at hand it appears that the fall of 3.00 in forty-five minutes at Pilot Point, Tex., on April 28, 1879, is the maximum rate that has ever occurred in this month.

WINDS.

The most frequent directions of the wind during April, 1888, are shown on chart ii by arrows flying with the wind. They were generally northeasterly in the upper Mississippi valley, Lake region, New England, and middle Atlantic states; southerly in the west Gulf states; and variable in other districts.

HIGH WINDS (in miles per hour).

No maximum velocities of fifty or miles per hour, other than those given in the table of miscellaneous meteorological data, have been reported.

LOCAL STORMS.

Waterville, Le Seuer Co., Minn.: severe local storms occurred to the northward of this place on the afternoon of the 4th. A large amount of damage was done at Faribault, about fifteen miles northeast of Waterville.

Clarksville, Greene Co., Pa.: the storm during the evening of the 5th was unusually violent, and caused extensive damage in this section.

Sharpsville, Mercer Co., Pa.: the storm of the 5–6th was of unusual severity, and caused considerable damage here and at Mercer, Sharon, and West Middlesex in this county.

Sewickley, Alleghany Co., Pa.: a severe hail storm occurred here about 4 p. m. on the 5th. Numerous windows were broken by the hail-stones. At Coraopolis, in this county, the storm is reported to have been unusually severe.

Perrysburg, Wood Co., Ohio: a severe storm, apparently a tornado, passed south of, and near, here shortly before dark on the 5th, its path being about two miles in length and one hundred yards in width.

Lima, Allen Co., Ohio: the storm of the night of the 5–6th unroofed buildings at this place, and blew down many derricks in the oil fields in Allen, Wood, and Hancock counties.

Connersville, Fayette Co., Ind.: many dwellings and barns were unroofed by a severe storm which passed in a southwesterly direction through this county between 7 and 8 p. m. on the 5th, its path being about eighty rods wide.

Delphi, Carroll Co., Ind.: a violent wind and rain storm occurred here between 5 and 6 p. m. on the 5th. At Sleeth, a small village northwest of here, two houses are reported to have been completely demolished and a train of freight cars was blown from the track. At Delphi 0.71 inch of rain fell in forty minutes.

Cunningham, Carlisle Co., Ky.: in this vicinity outbuildings, fences, etc., were blown down and some dwellings unroofed by the storm which occurred at 10 p. m. on the 5th.

Mauzy, Rush Co., Ind.: at about 7.20 p. m. on the 5th a tornado formed directly south of this place, distant about three miles, and moved eastward, unroofing buildings and demolishing outhouses. A large amount of damage was done to orchards and forests. The storm was accompanied by hail.

Muskegon, Muskegon Co., Mich: a rain and hail storm passed over this place during the early morning of the 5th, the hail causing considerable damage to windows and skylights.

Sioux City, Woodbury Co., Iowa: during a severe thunder-storm on the 5th a tornado cloud passed over this city from southwest to northeast; it struck the ground in but one place, where it destroyed a house, then rebounded and moved onward over the western suburbs.

Glenwood, Rush Co., Ind.: a severe local storm passed two miles south of here during the night of the 5–6th, unroofing buildings and causing other damage.

Nashville, Tenn.: very heavy rain fell from 2.30 to 2.45 p. m. on the 9th; from 7.23 to 7.28 the wind blew at the rate of fifty-two miles per hour. Trees, awnings, etc., were blown down by the high wind, and the heavy rainfall flooded cellars and washed out culverts.

Vineyard Haven, Mass.: during the southeasterly gale on the night of the 11–12th a number of vessels in this harbor dragged anchor and some sustained damage.

Charlotte, N. C.: during a thunder-storm on the afternoon of the 19th there was a heavy fall of hail at 6.10 o'clock; some of the hail-stones, which were of irregular form, measured three-fourths of an inch in length. The storm is reported to have been very severe to the east of the city.

Titusville, Fla.: a severe storm, moving from northwest to southeast, and attended by high wind, heavy rain, and hail, occurred on the 19th between 4.23 and 4.48 p. m., during which time 1.62 inches of rain fell. Several boats on the river were capsized and some old buildings blown down. The orange crop sustained serious injury in sections where the fall of hail was heaviest, but fortunately the path of the storm was nar-

row. Much window glass was broken by the hail-stones, which measured from one-fourth inch to one inch in diameter.

Cairo, Ill.: between 9.45 and 10.05 p. m. on the 22d a rain and hail storm prevailed. Vegetables were badly cut by the hail-stones, which measured half an inch in circumference.

Duquoin, Perry Co., Ill.: about 5 p. m. on the 22d a tornado passed through the southern limit of this town, demolishing outbuildings, fences, etc. The storm was of very short duration and moved from west to east.

Mobile, Ala.: a rain and hail storm of unusual severity passed over this city and the adjacent country on the 23d, lasting from 3.35 until 4.30 p. m. The fall of rain amounted to 2.74 inches, 2.60 of which fell in one hour. The streets of the city were flooded to such an extent as to be rendered impassable. Great damage was done to orchards and gardens through a section about a mile wide, extending through Mobile county.

Garden City, Finney Co., Kans.: reports from Coolidge, Hamilton Co. (in the extreme western part of Kansas), state that a violent hail storm occurred there on the afternoon of the 26th, the hail-stones being unusually large.

Pratt, Pratt Co., Kans.: during the afternoon of the 26th several houses were destroyed at this place by a violent storm. Many persons were badly injured by the flying débris of wrecked buildings.

Wa Keeney, Trego Co., Kans.: reports state that several houses were blown down at Millbrook, Graham Co. (about twenty miles north of Wa Keeney), by a storm which occurred during the evening of the 26th.

Hubbard, Hill Co., Tex.: a destructive tornado is reported to have occurred during the evening of the 26th seven miles south of this place, its path about one hundred yards wide.

WATER-SPOUT.

Jacksonville, Fla.: several persons report having observed a water-spout in Saint John's River at 12.25 p. m., 18th.

INLAND NAVIGATION.

STAGE OF WATER IN RIVERS AND HARBORS.

In the following table are shown the danger-points at the various stations, the highest and lowest depths for April, 1888, with the dates of occurrence and the monthly ranges:

Heights of rivers above low-water mark, April, 1888 (in feet and tenths).

Stations.	Danger-point on gauge.	Highest water.		Lowest water.		Monthly range.
		Date.	Height.	Date.	Height.	
Red River:						
Shreveport, La	29.9	1	24.8	17, 18, 19	20.5	4.3
Arkansas River:						
Fort Smith, Ark	22.0	30	16.3	7, 8	3.0	13.3
Little Rock, Ark	23.0	15	17.5	29	4.7	12.8
Missouri River:						
Omaha, Nebr	18.0	19	15.9	1	8.8	7.1
Leavenw'rth, Kans	20.0	21	17.5	1	11.7	5.7
Mississippi River:						
Saint Paul, Minn	14.5	14	14.4	7	3.8	10.6
La Crosse, Wis	24.0	18, 19, 20	14.8	1, 2	4.7	10.1
Dubuque, Iowa	16.0	24, 25	20.2	4	6.1	14.1
Davenport, Iowa	15.0	28	16.1	4, 5	5.9	10.2
Keokuk, Iowa	14.0	30	16.1	7, 8	8.1	8.0
Saint Louis, Mo	32.0	24	23.3	7	18.9	4.4
Cairo, Ill	40.0	3, 4, 5, 6	45.3	30	24.9	20.4
Memphis, Tenn	34.0	10, 11, 12	35.2	30	23.6	11.6
Vicksburg, Miss	41.0	26	44.2	1	32.5	11.7
New Orleans, La	13.0	26, 28	14.9	1	11.4	3.5
Ohio River:						
Pittsburg, Pa	22.0	7	15.9	30	3.3	12.6
Cincinnati, Ohio	50.0	1	39.9	30	14.0	25.9
Louisville, Ky	25.0	1	10.4	25, 26, 27, 30	7.1	9.3
Cumberland River:						
Nashville, Tenn	40.0	1	38.1	30	5.1	33.0
Tennessee River:						
Knoxville, Tenn	.....	.....	.....	.....	.....	.....
Chattanooga, Tenn	33.0	1	23.6	30	4.6	19.0
Monongahela River:						
Pittsburg, Pa	29.0	7	15.9	30	3.3	12.6
Savannah River:						
Augusta, Ga	32.0	1	21.7	30	8.3	13.4
Sacramento River:						
Red Bluff, Cal	.....	1	5.3	29	2.1	3.2
Sacramento, Cal	.....	25	18.3	8–12	16.3	2.0
Willamette River:						
Portland, Oregon	.....	28, 29, 30	9.3	6, 7, 11, 12	4.2	5.1

OPENING OF NAVIGATION—ICE IN RIVERS AND HARBORS.

Connecticut River.—Hartford, Conn.: the steamer "City of Springfield," the first boat of the season, arrived on the 1st.

Hudson River.—Albany, N. Y.: the ice dam at Barren Island broke during the night of 2–3d, leaving the river open between this place and New York City.

Lake Ontario.—Oswego, N. Y.: schooner "Wm. Jannison," from Whitby, Ontario, arrived on the 14th, and reported having encountered but little ice.

Rochester, N. Y.: the schooners "Caroline March," from Port Hope, Mich., and "Eliza Fisher," from Coburg, Ontario, arrived on the 8th.

Lake Erie.—Buffalo, N. Y.: steamer "J. C. Gilchrist" cleared for Chicago on the 28th, forcing her way through the ice which still extends as far as the eye can reach.

Sandusky, Ohio: the first boat of the season arrived on the morning of the 9th from Toledo, Ohio.

Detroit River.—Detroit, Mich.: steamer "J. C. Gilchrist," from Buffalo, bound for ports on Lake Michigan, passed this place on the 29th, being the first boat of the season.

Black River.—Port Huron, Mich.: the river was clear of ice on the 15th.

Lake Huron.—Port Huron, Mich.: steamer "Oscoda" arrived from Oscoda, Mich., on the 15th, being the first arrival this season from up the lake.

Saint Clair River.—Port Huron, Mich.: floating ice in river 1st to 4th, 8th; steamer "Saint Ignace" arrived from Detroit on the 7th and departed on the 9th.

Thunder Bay River.—Alpena, Mich.: the river was clear of ice on the 16th, on which date the steamer "Atlantic" from Detroit, Mich., arrived in bay, but did not reach port, the bay being frozen over, and was compelled to return to Detroit. Steamer "Arundel" from Bay City, Mich., arrived in port at 8.30 a. m., 29th, when navigation for the season was fully opened.

Strait of Mackinac.—Mackinaw City, Mich.: the ice boat "Saint Ignace" arrived off Mackinaw Island from Detroit on the 10th, being the first arrival of the season. The ice in the strait began to weaken on the 25th, but it remained firm in the narrows about a mile and a half west of the station.

Grand Traverse Bay.—Traverse City, Mich.: ice in the bay moved a distance of about a mile on the 27th, but it was driven back on the 28th; on the 30th drift ice extended about three-fourths of a mile from the shore to open water.

Lake Michigan.—Milwaukee, Wis.: at the close of the month navigation was generally resumed, all harbors on the lake being free of ice; the Strait of Mackinac, however, was still closed.

Grand Haven, Mich.: the first boat of the season from Chicago, Ill., arrived during the morning of the 10th.

Green Bay and Fox River.—Green Bay, Wis.: ice in river from its mouth to near Lake Winnebago broke up on the 10th. On the 16th the river was clear of ice, and Green Bay was open about one mile from the mouth of the river.

Lake Superior.—The observer at Duluth, Minn., reports, under the 30th, "the harbor is nearly clear of ice, and it is expected that the first strong southwesterly wind will break up the ice in the lake."

Mississippi River.—Saint Paul, Minn.: the ice dam at the bend of the river below the harbor moved out during the morning of the 9th, and that above the Wabash street bridge moved out about noon of the 10th, leaving the river free of ice. The steamer "Pittsburgh," from Saint Louis, Mo., arrived on the 26th, being the first arrival of the season.

La Crosse, Wis.: navigation was resumed on the 9th; floating ice in river on 11th and 12th.

Dubuque, Iowa: floating ice in river, 2d to 4th; the first steamer of the season arrived on the 11th.

Mr. C. H. Stoddard, of Rock Island, Ill., has kept a record of the opening and closing of the river at that place since 1851, which is given below:

Year.	Opened.	Closed.	Year.	Opened.	Closed.
1851		December 16	1871	February 25	December 5
1852	March 4	December 17	1872	March 28	November 29
1853	March 1	December 25	1873	March 15	December 28
1854	March 2		1874	March 10	
1855	March 8	January 21	1875	March 29	January 4
1856	March 29	December 24	1876	February 9	February 3
1857	Dec. 27..(?)...	Open.	1877	February 21	Open.
1858	March 21	January 29	1878		December 19
1859		December 20	1879	March 8	December 17
1860	March 3	December 22	1880	January 6	November 21
1861	March 2	December 28	1881	April 15	Open.
1862	March 23	Open.	1882		December 18
1863		December 18	1883	March 17	December 14
1864	March 2	December 7	1884	March 24	December 17
1865	March 6	December 12	1885	March 29	December 14
1866	March 7	December 27	1886	March 16	December 1
1867	April 6	December 8	1887		{ November 29; December 24
1868	March 12	December 9			
1869	February 13		1888	March 18	
1870	March 24	January 18			

The Red River of the North.—Moorhead, Minn.: ice in river moved out rapidly on the 17th; navigation was resumed on the 23d; steamers "Grandin" and "Pluck" arriving on the latter date.

Missouri River.—Fort Buford, Dak.: ice in river began to move between 4 and 5 p. m. on the 10th; the river rose two feet within an hour but in a short while fell about as rapidly as it had risen.

Bismark, Dak.: the ice broke up and moved down the river on the 9th.

Fort Yates, Dak.: the ice in the river began to break up on the 4th; heavy drift ice on 10th and 13th; steamer "Bachelor" arrived on the 22d, being the first boat of the season from points up the river.

Fort Sully, Dak.: ice in river broke up on the 1st; floating ice from the 4th to 7th; navigation was resumed on the 17th, the steamer "General Terry" being the first boat to leave this place.

Pennsylvania Canal.—Catawissa, Columbia Co., Pa.: navigation for the season on the north branch of the canal was resumed on the 2d.

FLOODS.

Clear Lake, Cerro Gordo Co., Iowa: the heavy rains during the night of the 4th, together with prevailing high temperature, caused a general breaking up of the ice in all streams in this vicinity, and numerous destructive freshets occurred.

Sheboygan, Sheboygan Co., Wis.: the heavy rain during the night of the 4–5th caused the Sheboygan River to reach the highest stage known for a number of years.

Baraboo, Sauk Co., Wis.: the water-works dam at this place was washed out on the 5th.

Waverly, Bremer Co., Iowa: the freshet during the 5th and 6th in Cedar River was the most destructive that has ever occurred here, about one-half of the town being submerged. The tracks of the Waverly Short Line Railroad were two feet under water. The mills at Waverly were compelled to stop work.

Mason City, Cerro Gordo Co., Iowa: destructive freshets occurred in this county during the 5–6th. The town of Rock Falls, on the Shell Rock River, was inundated and an iron bridge washed away.

Sioux City, Iowa, 6th: the freshet in the Missouri River immediately above this place is considered the most destructive that has occurred since 1881, the region inundated being on the Dakota side of the river. It is reported that about four miles of railroad track in the vicinity of Elk Point, Dak., were washed out.

Albany, N. Y.: the water in Hudson River rose rapidly during the night of the 6th and by 7 a. m. on the 7th it had submerged the docks to a depth of two or three feet, causing suspension of business on Quay street.

West Stockbridge, Berkshire Co., Mass.: freshets occurred here during the night of the 6–7th, causing considerable damage to bridges, dams, etc.

Flandreau, Mooda Co., Dak.: on the 7th the Sioux River at this place was higher than has been known during the last six years.

Eau Claire, Eau Claire Co., Wis., 12th: during the last three days the Chippewa and Eau Claire rivers have risen several feet, washing away about one million feet of lumber.

Grand Rapids, Wood Co., Wis.: the bridge over the Wisconsin River between this place and Centralia was washed away by the freshet of the 12th, entailing a loss of $12,000.

Arcadia, Trempealeau Co., Wis.: Trempealeau River reached a very high stage on the 12th and flooded some of the lower streets.

Berlin, Green Lake Co., Wis.: on the 12th Fox River reached an unusually high stage, compelling the factories here to suspend work. About fifty houses were surrounded by water.

Red Wing, Goodhue Co., Minn., 12th: nearly two miles of railroad track were washed out about seven miles from here.

Saint Paul, Minn., 12th: recent freshets in Zumbrota, Vermillion, and Root rivers have washed away numerous bridges, causing suspension of travel on several railroads. A part of the town of Zumbrota was submerged. At Hastings the Vermillion River reached the highest stage known for many years, and washed away several bridges.

Ama, Buffalo Co., Wis.: on the 17th the water from the Mississippi overflowed a large area in this vicinity, compelling about twenty families to abandon their homes. The damage to property in this section is estimated at $50,000.

Moorhead, Minn.: the Red River of the North overflowed on the 17th, causing great damage on bottom lands; two bridges, south of this city, are reported to have been carried away.

Prairie du Chien, Crawford Co., Wis.: a considerable part of this place was flooded on the 19th, when the Mississippi was within a few inches of the high-water mark of 1880.

"The Cleveland (Ohio) Leader and Herald" of the 30th contained the following:

SAINT LOUIS, *April* 29.—Telegrams from the northern cities of Texas report exceedingly heavy rains which have swelled the rivers beyond their banks, inundated the bottoms, and almost swamped towns, causing a great deal of damage to property and an immense amount of good to crops. The Washata River in the Chickasaw Nation has flooded the lowlands, washing away Dougherty Station and a mile of railroad track, including culverts and bridges. The Red River is higher than ever known before. In Choctaw Bayou, a few miles from Sherman, people were compelled to take to the trees on Friday, and were not rescued until yesterday morning. The Texas Pacific Railroad has suffered great damage from washouts, and South Bonham has been overflowed to the depth of four feet in many places. Forty families near Atoka have been compelled to abandon their homes, and reports from Muskogee, Indian Territory, indicate much misfortune throughout the territory.

Gainesville, Cook Co., Tex.: the heavy rains of the 27th and 28th caused great damage. All railroad communication was cut off on account of washouts. A mile of railroad track in the vicinity of Dougherty Station, Chickasaw Nation, Ind. T., is reported to have been entirely washed away and an extensive landslide from Arbuckle Mountain covered several hundred feet of track. The Red River reached an unusually high stage and flooded adjacent portions of the Indian Territory and Texas. Portions of Gainesville were flooded and some dwellings washed away.

Plano, Collin Co., Tex.: the heavy rain which fell here during the night of the 27–28th washed away numerous bridges in this section.

Fort Worth, Tarrant Co., Tex.: the heavy rains of the 27th and 28th caused all streams in this section to rise, the Trinity River reaching the highest stage for past two years.

Denison, Grayson Co., Tex.: the heavy rains of the 27th and 28th caused a large amount of damage to crops, stock, and railroads. The Missouri Pacific Railroad, between this place and Fort Worth, had nearly all bridges washed out or damaged

and twenty miles of the Missouri, Kansas, and Texas tracks between Atoka and Durant, Ind. T., were under water.

Rockwall, Rockwall Co., Tex.: the East Fork of the Trinity River overflowed in this vicinity on the 29th.

Bonham, Fannin Co., Tex.: on the 30th reports from the northern part of this county stated that the Red River was higher than has been known for years, and that all crops in the lowlands had been destroyed.

Navasota, Grimes Co., Tex.: the Brazos, Navasoto, San Jacinto, and Saline rivers have flooded the districts to the south and east of here, causing extensive damage to crops.

Burnet, Burnet Co., Tex., 30th: the recent heavy rains have caused a high stage of water in the Colorado River. Cattle, sheep, drift wood, etc., are seen floating past this place.

Northfield, Vt.: the warm weather on the 28–29th melted the large accumulation of snow in this region causing the Dog River to overflow on the 29th; some outhouses were carried away by the flood.

Hartford, Windsor Co., Vt.: Connecticut and White rivers were higher on the 30th than since the great freshet of 1869.

Croydon, Sullivan Co., N. H.: considerable damage was done by the washing out of a new dam on the 30th.

Concord, N. H.: the lowlands in this vicinity were flooded on the 30th.

Contoocook, Merrimac Co., N. H.: suspension of work in all of the local mills was caused by high water on the 30th.

Biddeford, Me.: the Saco River rose rapidly on the 30th; several saw-mills along the river were compelled to shut down on account of the high water.

The following reports are from stations on the Mississippi:

Saint Paul, Minn.: the river was frozen here from the 1st to the 6th, inclusive; the ice broke up on the 7th, from which date until the 14th the river continued to rise, reaching its highest point on the last-named date, after which it fell a few inches daily until the 28th; it was stationary on the 29th and rose .3 of a foot on the 30th. On the 12th the lower portion of the city called "The Bohemian Settlement," covering about one-third of a square mile, together with lowlands on the opposite side of the river, were flooded to a depth of several feet.

La Crosse, Wis.: at this station the river was about ten feet below the danger-line when at its highest stage from the 18th to 20th; previous to the 18th the river rose steadily, and from the 21st to 30th there was a decline. Only twice since the establishment of the signal office at La Crosse, in 1873, has the Mississippi reached a higher stage than was attained on the 19th, viz., June, 1880, and October, 1881.

Dubuque, Iowa: the river ranged from six to twenty feet, being lowest on the 4th and highest and about stationary from the 22d to the 26th; there was a steady rise from the 7th to the 25th, and from the latter date to the close of the month a very slight decline; it reached the danger-line on the 19th, and remained above that point until the end of the month, being four feet above the danger-line when at its highest stage. All the islands in this vicinity were under water on the 19th, and portions of east Dubuque were also inundated. On the 22d all saw-mills and many factories suspended operations, and about fifty families were compelled to abandon their houses. The damage from the freshet was comparatively slight.

Davenport, Iowa: the depth of water in the river ranged between six and sixteen feet, there being a gradual rise throughout the month, with the exception of a few dates on which it was stationary or falling slightly. It reached the danger-line on the 24th and remained above it till close of month.

Keokuk, Iowa: the variations in the depth of water at this station between the 1st and 23d were very slight; from the latter date until the close of the month there was a slight but gradual rise, the river reaching its highest point, two feet above danger-line, on the last day of the month. The bottom lands south of Alexandria, Mo., were overflowed to some extent, but no serious damage was done.

Saint Louis, Mo.: the range of water in the river at this place during April was 4.4 feet; it was at no time within 8 feet of the danger-point, and the changes were very gradual.

Cairo, Ill.: the river was highest between the 1st and the 6th, when it was from 4.5 to 5 feet above the danger-line; it was practically below the danger-line after the 11th, and fell gradually from that date till the end of the month, when it was 15 feet below the danger-point. On the 16th the lowlands both above and below Cairo were overflowed for the second time this season, greatly retarding farm work.

Memphis, Tenn.: on the 1st of the month the river was within two feet of the danger-line; it rose very slowly, being about stationary on several dates, until the 12th, when it was one foot above the danger-line; there was a slight but continuous fall subsequent to the 15th.

Vicksburg, Miss.: the river rose daily from the 1st to 24th, and remained about stationary after the latter date; it reached the danger-line on the 14th, and was three feet above that point when at its highest stage on the 26th.

New Orleans, La.: while there were several dates on which the river was about stationary, it rose slowly for the most part during the month; the danger-line was passed on the 8th, and at the close of the month the river was about two feet above that point. The river was running over the levee at Clouett street on the 27th, and the waters from Saint Sophia River submerged the lowlands on the 28th.

HIGH TIDE.

Eastport, Me., 26th.

ATMOSPHERIC ELECTRICITY.

AURORAS.

Of the numerous auroral displays which occurred during April the most important were those of the 2d and 11th; these displays were observed over much the same territory, viz., from eastern Montana to New England, and southward to about the fortieth parallel; they were most brilliant in the upper lake region, upper Mississippi valley, and extreme northwest.

The following are some of the descriptions that have reached this office of the auroras above referred to:

Fort Buford, Dak.: the aurora of the 2d first appeared at 9.44 p. m. as a well defined arch over a dark segment, the arch having an altitude of 20° and extending from the northwest to northeast. At 10 p. m. a second arch was formed above the first at an altitude of 35°, and at the same time green and white streamers shot upwards to an altitude of 65°. At 11.35 p. m. the arches had united, and the display had the appearance of a bank of fog. The aurora had disappeared at 12.35 a. m., 3d.

Bismarck, Dak.: an auroral light, extending in a continuous sheet from azimuth 105° to 225° and to an altitude of 60°, was first observed at 10 p. m., 2d; stratus clouds obscured the display at 11.30 p. m. A similar display occurred on 11th, beginning at 9.55 and ending at 11.30 p. m.

Fort Sully, Dak., 2d: an unusually brilliant auroral display was observed from 9.30 to 11.50 p. m.; it consisted of an arch of bright light which rose to altitude 20° and covered one hundred degrees of the horizon; a second arch, from which streamers shot upward about 5°, appeared about two degrees above the first one.

Saint Paul, Minn., 2d: an aurora in the form of a double arch, with limits poorly defined, was observed at 9.35 p. m.; the upper arch had an altitude of 75° and the lower one 45°; at 10.30 p. m. there were three arches, the middle one being somewhat indistinct; at 11 p. m. the upper arch had broadened and become more diffuse and extended to about twenty degrees south of zenith, at the same time the lower arch had risen to

twenty-five degrees above the horizon, and the middle arch was gradually fading away. At 11.35 p. m. the display had changed to a bright arch three degrees high and covered fifty degrees of the horizon. The display ended during night.

Green Bay, Wis.: a brilliant auroral display occurred on the 2d, consisting of an arch of white light of about twenty degrees in width, covering one hundred degrees of the horizon, and reaching an altitude of 30°; beneath the arch was a dark segment, through which the stars were seen; at 11 p. m. the arch was the same, but some streamers extended from it to an altitude of 45°; the display ended at 11.30 p. m.

Green Bay, Wis.: a very brilliant aurora was observed on the 11th; when first seen, at 9.55 p. m., the whole northern sky to an altitude of 40° was covered with cirro-stratus clouds, apparently without motion; behind these the horizon was illuminated as if by bright moonlight; well-defined streamers shot up to an altitude of 50° or more. The display faded away at 11.30 p. m., and at midnight there was only a faint glow along the northern horizon.

Marquette, Mich., 2d: an auroral display began at 7.30 p. m.; a dark segment extended from north to east, above which was an arch of white light, reaching within a few degrees of the zenith and covering about 90° of the horizon. At 9 p. m. a second arch was formed about 15° above the first one; the display, which was very brilliant, ended at 11.20 p. m. The display of the 11th was very brilliant; it began at 8.50 p. m., consisting of a small well-defined arch, having an altitude of 35° and covering 95° of the horizon; the aurora assumed different shapes and increased in brilliancy until 11.10 p. m., after which it began to fade and ended at 11.50 p. m.

Grand Haven, Mich., 2d: aurora at 9.38 p. m.; maximum extent and brilliancy occurred at 10.20 p. m., at which time it had attained an almost uniform altitude of 60° and covered about 158° of the horizon; a second period of maximum brilliancy occurred at 12.42 a. m., 3d, when the entire northern sky to an altitude of 50° was covered by a rose-colored light, through which passed streamers of a dark hue; at 12.54 a. m. the aurora began to fade slowly and changed into a pale straw color. A third maximum brilliancy occurred at 1.30 a. m. and lasted but two minutes, after which it gradually disappeared.

Toledo, Ohio, 2d: an auroral light was observed at 10 p. m.; it consisted of a greenish light, extending to an altitude of 20° and covering 45° of the horizon. The display was brightest at 10.50 p. m., after which time it began to diminish, and by 11.50 p. m. it had entirely disappeared.

Napoleon, Henry Co., Ohio: a brilliant auroral arch appeared shortly before 9 p. m. on the 2d and lasted about two hours; it consisted of an arch which attained an altitude from 20° to 25°; no streamers were visible.

Saint Vincent, Minn.: an aurora appeared at dusk on 11th; its maximum brilliancy occurred at 10.30 p. m., at which time there were two arches, the upper one being 20° high and about 3° above the lower one; from the arches numerous slender beams projected, nearly reaching the zenith. There also appeared a bank of bright yellow light 1° in width, running from east to west and passing 5° south of the zenith. During the auroral display on the evening of the 12th there appeared immediately after sunset a narrow band of light near the zenith; it moved slowly southward past the zenith and disappeared when about 20° south, retaining a position at right angles with the true meridian. About the time of its disappearance there arose from the northern horizon a similar band, which disappeared when about 10° north of zenith.

Moorhead, Minn., 11th: a brilliant auroral display occurred on the evening of the 11th; it was first observed at 9.30 p. m.; at 10 p. m. two arches had formed; then the upper began to rise and by 10.45 had reached the zenith; at 10.50 p. m. the arch in the zenith broke into short streamers, which moved rapidly westward. At 11 p. m. the arch had entirely disappeared, except the lower extremities.

Fort Totten, Dak.: a bright aurora, with shooting rays, was observed from 9.25 to 11.30 p. m., 11th; at 10.30 p. m. a band of light, 1° wide, extended from east to west, passing a little south of zenith. The display faded at 11.15 p. m., disappearing first at its east and west extremities and last at the zenith.

Grand Haven, Mich., 11th: a faint aurora was observed at 9.20 p. m.; it increased rapidly in brightness until 9.40 p. m., at which time it was very brilliant, and covered 100° of the horizon; the display began to fade at 10 p. m. and had entirely disappeared at 11 p. m.

Auroras were observed during month as follows: 1st, Saint Vincent, Minn.; Fort Maginnis, Mont. 2d, Goodwin, New Haven, and Voluntown, Conn.; Bismarck, Fort Buford, Fort Meade, Fort Sully, Garden City, and Webster, Dak.; La Grange and Lafayette, Ind.; Albion, Amana, Bancroft, Clinton, Cresco, Des Moines, Dubuque, Fort Madison, Hampton, Independence, Keokuk, Maquoketa, Monticello, and Osage, Iowa; Gardiner, Me.; Blue Hill, Dudley, Provincetown, Westborough, Wood's Holl, and Worcester, Mass.; Alpena, Grand Haven, Lansing, Marquette, Thornville, and Traverse City, Mich.; Saint Paul, Minn.; Fort Maginnis and Poplar River, Mont.; Nashua, N. H.; Moorestown, N. J.; Ardenia, Buffalo, Oswego, Palermo, and Setauket, N. Y.; Garrettsville, Jacksonborough, Lordstown, Napoleon, Sandusky, Toledo, and Wauseon, Ohio; Grampian Hills, Pa.; Block Island, R. I.; Manchester and Northfield, Vt.; Delavan, Deuster, Fredonia, Green Bay, La Crosse, Madison, Manitowoc, and Waucousta, Wis. 3d, Red Bluff, Cal.; Voluntown, Conn.; Eastport and Gardiner, Me.; Blue Hill, Cambridge, Provincetown, and Westborough, Mass.; Duluth, Moorhead, and Saint Paul, Minn.; Fort Maginnis, Mont.; Berlin Mills and Nashua, N. H.; Moorestown, N. J.; Northfield, Vt.; Madison, Wis. 4th, Fort Sully, Dak.; Gardiner, Me.; Saint Paul, Minn.; Fort Maginnis and Poplar River, Mont. 5th, Fort Totten, Huron, and Webster, Dak.; Cresco, Iowa; Marquette, Mich.; Duluth and Moorhead, Minn.; Deuster, Wis. 6th, Carson City, Nev. 7th, Virginia City, Mont. 10th, Huron, Dak.; Marquette, Mich.; Duluth and Moorhead, Minn.; Deuster, Wis. 11th, Bismarck, Fort Totten, Fort Yates, and Webster, Dak.; Sycamore, Ill.; La Grange, Ind.; Albion, Amana, Bancroft, Clinton, Cresco, Fort Madison, Glenwood, Independence, Manson, Monticello, Osage, Oskaloosa, and West Bend, Iowa; Boston and Fall River, Mass.; Alpena, Grand Haven, Marquette, Thornville, and Traverse City, Mich.; Moorhead, Saint Paul, and Saint Vincent, Minn.; Poplar River, Mont.; Clayton and Moorestown, N. J.; Factoryville, Ithaca, Palermo, Palmyra, Rochester, Rose, and Setauket, N. Y.; Wauseon, Ohio; Catawissa, Dyberry, Easton, and Troy, Pa.; Delavan, Deuster, Green Bay, La Crosse, Lancaster, Madison, and Manitowoc, Wis. 12th, Lansing, Mich.; Moorhead and Saint Vincent, Minn.; Poplar River, Mont.; Beverly, N. J.; Oswego, N. Y.; Manitowoc, Wis. 13th, Voluntown, Conn.; Webster, Dak.; Cornish, Me.; Fall River and Provincetown, Mass.; Moorhead and Saint Vincent, Minn.; Poplar River, Mont.; Berlin Mills, N. H.; Northfield, Vt.; Manitowoc, Wis. 14th, Smithville, Iowa; Moorhead, Minn.; Poplar River, Mont. 15th, Moorhead, Minn.; Poplar River, Mont.; Pekin, Ill.; Parkston, Dak.; Saint Vincent, Minn. 30th, Moorhead and Saint Vincent, Minn.

THUNDER-STORMS.

Thunder-storms were reported as follows: 1st, Little Rock, Ark.; Oswego, Pekin, and Springfield, Ill.; Indianapolis and Terre Haute, Ind.; Detroit, Lansing, and Mottville, Mich.; Auburn, Buffalo, Geneva, Fort Niagara, Humphrey, Ithaca, Le Roy, Palermo, Penn Yan, Oswego, Rose, Syracuse, and Utica, N. Y.; Cleveland, Elyria, Garrettsville, North Lewisburg, Sandusky, Toledo, Wauseon, and West Milton, Ohio; Corry and Erie, Pa. 2d, Auburn and New Market, Ala.; Hot Springs, Ark.; Pike's Peak, Colo.; New London and Voluntown, Conn.; Fort Sully, Kimball, Parkston, and Woonsocket, Dak.; Augusta, Athens, and Forsyth, Ga.; Allison, Kans.; Edgartown, New Bedford, Taunton, Vineyard Haven, and Wood's Holl, Mass.; Hay Springs, Nebr.; Albany, Ithaca, and Syracuse, N. Y.; Charlotte, Kitty Hawk, Southport, Wash

Woods, Weldon, and Wilmington, N. C.; Cleveland, Columbus, Ruggles, Sandusky, Tiffin, and Toledo, Ohio; Corry, Erie, Grampian Hills, Troy, and Wellsborough, Pa.; Cedar Springs and Columbia, S. C.; Chattanooga, Knoxville, Milan, and Nashville, Tenn.; Middlebury, Vt.; Middlebrook and Parkersburg, W. Va. 3d, Auburn and Montgomery, Ala.; Hot Springs, Ark.; Fort Bidwell, Cal.; Fort Randall, Dak.; Cedar Keys, Duke, Jacksonville, and Sebastian, Fla.; Augusta, Athens, Forsyth, Milledgeville, and Savannah, Ga.; Manson, Iowa; Wakefield, Kans.; University, Miss.; Charlotte and Flat Rock, N. C.; Columbia and Stateburg, S. C.; Nashville, Tenn.; Neah Bay, Wash. 4th, New Market, Ala.; Hot Springs, Ark.; Fort Sully, Fort Yates, Huron, Parkston, Webster, and Yankton, Dak.; Duke, Fla.; Forsyth and Milledgeville, Ga.; Charleston and South Evanston, Ill.; Auburn, Bancroft, Clear Lake, Cresco, Cromwell, Elkader, Osage, and Sac City, Iowa; Kalamazoo, Marquette, and Traverse City, Mich.; Duluth, Fort Snelling, Minneapolis, and Moorhead, Minn.; Genoa, Nebr.; Milan and Nashville, Tenn.; Deuster, La Crosse, and Manitowoc, Wis.; Camp Sheridan, Wyo. 5th, Hot Springs, Ark.; New Hartford and Voluntown, Conn.; Washington City; Duke, Fla.; Cairo, Charleston, Chicago, Jacksonville, Pekin, Palestine, Sandwich, Springfield, Sycamore, and Windsor, Ill.; Butlerville, Indianapolis, La Grange, Logansport, Mauzy, Sunman, Terre Haute, and Vevay, Ind.; Fort Gibson, Ind. T.; Auburn, Cresco, and Dubuque, Iowa; Frankfort, Lexington, and Louisville, Ky.; Orono, Me.; Baltimore and Mount Saint Mary's College, Md.; Amherst, Deerfield, Dudley, and Nantucket, Mass.; Leon de Aldamas, Mex.; Birmingham, Detroit, Grand Haven, Hudson, Kalamazoo, Lansing, Marquette, Mottville, and Thornville, Mich.; Lamar and Springfield, Mo.; Nashua, N. H.; Atlantic City, Beverly, Clayton, Egg Harbor City, Moorestown, Readington, and Vineland, N. J.; Albany, Ardenia, Auburn, Brooklyn, Buffalo, Fort Columbus, Fort Niagara, Geneva, Humphrey, Le Roy, Oswego, Palermo, Setauket, Syracuse, and Utica, N. Y.; Cincinnati, Cleveland, College Hill, Columbus, Elyria, Garrettsville, New Athens, North Lewisburg, Sandusky, Tiffin, Toledo, Wauseon, West Milton, Yellow Springs, and Youngstown, Ohio; Catawissa, Corry, Drifton, Dyberry, Erie, Grampian Hills, Philadelphia, Pittsburg, Quakertown, Reading, State College, Troy, and Wellsborough, Pa.; Dale Enterprise, Va.; Clarksburg, Helvetia, Middleborough, and Parkersburg, W. Va.; Delavan, Fond du Lac, Lancaster, Madison, and Milwaukee, Wis. 6th, Auburn and New Market, Ala.; Lead Hill, Fort Smith, and Hot Springs, Ark.; New Hartford, New Haven, and New London, Conn.; Parkston, Dak.; Fort Sill, Ind. T.; Topeka, Kans.; Lexington, Ky.; Blue Hill, Cambridge, Fall River, Somerset, Taunton, and Westborough, Mass.; Leon de Aldamas, Mex.; University, Miss.; Antrim, N. H.; Ardenia and Utica, N. Y.; Weldon, N. C.; Easton, Philadelphia, and Quakertown, Pa.; Cedar Springs, Columbia, and Stateburg, S. C.; Chattanooga, Knoxville, and Nashville, Tenn.; Cleburne, Comanche, and Mesquite, Tex.; Dale Enterprise, Va.; Clarksburg and Middlebrook, W. Va. 7th, Montgomery, Ala.; Yuma, Ariz.; Hot Springs, Ark.; Jacksonville, Pensacola, and Tallahassee, Fla.; Milledgeville, Ga.; Allison, Dodge City, Tribune, and Wakefield, Kans.; Gallinas Spring and Fort Stanton, N. Mex.; Cedar Hill, Fort Davis, Fort Elliott, and Silver Falls, Tex.; Prairie du Chien, Wis. 8th, Auburn, Ala.; Hot Springs, Ark.; Colorado Springs, Las Animas, and Pike's Peak, Colo.; Yankton, Dak.; Alva, and Limona, Fla.; Fort Gibson, Fort Reno, Fort Sill, and Fort Supply, Ind. T.; Osage, Iowa; Dodge City, Emporia, Independence, Ninnescah, Salinas, and Tribune, Kans.; Lamar, Mo.; Hay Springs, Nebr.; Fort Stanton, Gallinas Spring, and Lava, N. Mex.; Abilene, Comanche, Decatur, Fort Elliott, San Antonio, and Silver Falls, Tex.; Cheyenne and Camp Sheridan, Wyo. 9th, Auburn and New Market, Ala.; Hot Springs, Lead Hill, and Little Rock, Ark.; Alva, Fla.; Cairo, Charleston, Collinsville, and Windsor, Ill.; Indianapolis, Terre Haute, and Vevay, Ind.; Fort Sill, Ind. T.; El Dorado, Globe, and Yates Center, Kans.; Frankfort, Lexington, and Louisville, Ky.; Lamar and Springfield, Mo.; Ashwood, Chattanooga, Memphis, Milan, and Nashville, Tenn.; Palestine, Tex. 10th, Auburn, New Market, and Montgomery, Ala.; Fort Randall, Kimball, and Yankton, Dak.; Cedar Keys and Jacksonville, Fla.; Augusta, Forsyth, Milledgeville, and Savannah, Ga.; Palestine, Ill.; Fort Sill, Ind. T.; Terre Haute, Ind.; Allison and Ninnescah, Kans.; Lexington, Ky.; Grand Coteau and Shreveport, La.; University, Miss.; Fort Stanton, Gallinas Spring, and Lava, N. Mex.; Humphrey and Ithaca, N. Y.; Southport, N. C.; Catawissa, Corry, Erie, Pittsburg, and State College, Pa.; Aiken and Stateburg, S. C.; Chattanooga, Knoxville, Memphis, and Nashville, Tenn.; Corpus Christi, Fort Elliott, New Ulm, Palestine, and San Antonio, Tex.; Marion and Wytheville, Va. 11th, Auburn and Mobile, Ala.; Cedar Keys, Duke, Pensacola, and Titusville, Fla.; Milledgeville, Ga.; Fort Sill, Ind. T.; Allison, Ninnescah, and Wilson, Kans.; Grand Coteau, La.; Leon de Aldamas, Mex.; Biloxi, Miss.; Corpus Christi, Fort Davis, Fort Elliott, Gallinas, Lampasas, and Rio Grande City, Tex. 12th, Archer, Fla.; Chincoteague, Va.; Hatteras and Wash Woods, N. C.; Easton, Pa.; Abilene, Comanche, Gallinas, and Lampasas, Tex.; Delavan, Wis. 13th, Archer, Fla.; La Grange, Ind.; Grand Haven, Kalamazoo, and Lansing, Mich.; Delavan, Wis. 14th, Tucson, Ariz.; Parkston, Dak.; Archer, Fla.; Chicago and South Evanston, Ill.; Cromwell, Iowa; Omaha, Nebr.; Clarksburg, W. Va.; Milwaukee, Wis. 15th, Willcox and Whipple Barracks, Ariz.; Archer, Fla.; Chicago, Sandwich, and Sycamore, Ill.; La Grange and Logansport, Ind.; Dubuque and Osage, Iowa; Mottville, Mich.; College Hill, Elyria, Garrettsville, Jacksonborough, North Lewisburg, Napoleon, and Portsmouth, Ohio; Variety Mills, Va.; Middlebrook and Parkersburg, W. Va.; Delavan, La Crosse, Lancaster, and Prairie du Chien, Wis. 16th, Fort Thomas, Ariz.; Banning and Keeler, Cal.; Fort Sully, Huron, Parkston, and Webster, Dak.; Archer, Fla.; Augusta and Savannah, Ga.; Fort Supply, Ind. T.; Albion, Auburn, Clear Lake, Elkader, Fort Madison, Hampton, Keokuk, Maquoketa, Manson, and Sac City, Iowa; Minneapolis, Minn.; Crete and Marquette, Nebr.; Fort Stanton and Gallinas Spring, N. Mex.; Charleston, S. C.; Brownsville, Tex.; Clarksburg, W. Va.; Deuster and Madison, Wis. 17th, Montgomery and New Market, Ala.; Yuma, Ariz.; Banning and Los Angeles, Cal.; Cedar Keys, Fla.; Windsor, Ill.; Auburn, Cresco, Des Moines, and West Bend, Iowa; Emporia, Globe, Lebo, Ninnescah, Topeka, Wakefield, and Yates Centre, Kans.; Birmingham and Lansing, Mich.; Fort Snelling, Minn.; Lamar, Mo.; Fort Stanton, N. Mex.; Ashwood and Nashville, Tenn.; Abilene, Comanche, Fort Davis, New Ulm, Rio Grande City, San Antonio, and Silver Falls, Tex.; Delavan, Fond du Lac, Lancaster, and Manitowoc, Wis. 18th, Auburn and New Market, Ala.; Yuma, Ariz.; Banning, Cal.; Jacksonville, Fla.; Terre Haute, Ind.; Shreveport, La.; Egg Harbor City, N. J.; Charlotte, Raleigh, Statesville, and Weldon, N. C.; Columbus, Yellow Springs, and Youngstown, Ohio; Cedar Springs, Columbia, and Stateburg, S. C.; Chattanooga and Knoxville, Tenn.; Cleburne, Comanche, Gallinas, Lampasas, Rio Grande City, and San Antonio, Tex.; Bird's Nest, Cape Henry, Lynchburg, Marion, Norfolk, Variety Mills, and Wytheville, Va.; Parkersburg, W. Va. 19th, Mobile and Montgomery, Ala.; Titusville, Fla.; Atlanta, Augusta, and Savannah, Ga.; Liberty Hill, La.; Grand Haven, Mich.; Charlotte, Statesville, and Wilmington, N. C.; Aiken, Cedar Springs, Charleston, and Stateburg, S. C.; San Antonio, Tex.; Marion, Va. 20th, Fort Grant, Fort McDowell, Fort Thomas, Whipple Barracks, Willcox, Ariz.; Titusville, Fla.; Albion, Iowa; Southport and Wilmington, N. C.; Brownsville, Fort Davis, and Gallinas, Tex. 21st, Fort Apache, Fort McDowell, Whipple Barracks, and Willcox, Ariz.; Banning and Willows, Cal.; Fort Supply, Ind. T.; Taunton, Mass.; Leon de Aldamas, Mex.; Santa Fé, N. Mex.; Corpus Christi, Fort Davis, and Gallinas, Tex.; Brock's Ranch, Utah. 22d, Fort Bowie and Yuma, Ariz.; Lead Hill, Ark.; Lewis

Creek and Keeler, Cal.; Montrose, Colo.; Parkston, Dak.; Cairo, Palestine, and Springfield, Ill.; Butlerville, Sunman, and Vevay, Ind.; Fort Reno, Ind. T.; El Dorado, Globe, Independence, Ninnescah, and Yates Centre, Kans.; Frankfort, Lexington, and Louisville, Ky.; Grand Coteau, La.; Leon de Aldamas, Mex.; Lamar and Springfield, Mo.; Milan and Nashville, Tenn.; Cleburne, Tex. 23d, Mobile, Montgomery, and New Market, Ala.; Fort McDowell and Whipple Barracks, Ariz.; Lead Hill and Little Rock, Ark.; Fort Bidwell, Louis Creek, and Sacramento, Cal.; Montrose, Colo.; Pensacola, Fla.; Savannah, Ga.; Fort Gibson, Fort Reno, and Fort Sill, Ind. T.; Dodge City, Kans.; Lexington, Ky.; Grand Coteau, New Orleans, and Shreveport, La.; Biloxi, Miss.; Fort Stanton, Las Vegas, Lava, and Santa Fé, N. Mex.; Ashwood, Chattanooga, and Nashville, Tenn.; Cleburne, Corsicana, Gallinas, Galveston, New Ulm, and San Antonio, Tex.; Fort Laramie, Wyo. 24th, Fort Buford, Dak.; Dodge City, Kans.; Leon de Aldamas, Mex.; Fort Assinaboine, Fort Custer, Fort Maginnis, Mont.; Fort Stanton, N. Mex.; Abilene, Cleburne, Comanche, Galveston, and Silver Falls, Tex.; Brock's Ranch, Utah. 25th, Las Animas, Colo.; Fort Buford, Fort Sully, Huron, Rapid City, and Webster, Dak.; Fort Supply, Ind. T.; Ninnescah, Kans.; Leon de Aldamas, Mex.; Rose, N. Y.; Cedar Hills, Cleburne, and Comanche, Tex.; Brock's Ranch and Fort Du Chesne, Utah. 26th, Hot Springs, Ark.; Las Animas, Colo.; Webster, Dak.; Fort Reno and Fort Supply, Ind. T.; Albion, Amana, Ames, Auburn, Bancroft, Cedar Rapids, Clear Lake, Cresco, Des Moines, Dysart, Elkader, Glenwood, Hampden, Independence, Manson, Maquoketa, Monticello, Osage, Sac City, and Vinton, Iowa; Allison, Tribune, and Wakefield, Kans.; Shreveport, La.; Leon de Aldamas, Mex.; Duluth and Fort Snelling, Minn.; De Soto, Genoa, Marquette, North Platte, Omaha, and Syracuse, Nebr.; Fort Stanton and Gallinas Spring, N. Mex.; Brownsville, Cedar Hills, Comanche, Corpus Christi, Corsicana, Fort Elliott, Galveston, Mesquite, Palestine, San Antonio, and Silver Falls, Tex.; Deuster, La Crosse, Madison, Prairie du Chien, and Waucousta, Wis.; Fort McKinney, Wyo. 27th, Fort Smith, Ark.; Las Animas, Colo.; Fort Reno, Fort Sill, and Fort Supply, Ind. T.; Ames, Auburn, Cresco, Independence, and Manson, Iowa; Dodge City, Independence, Ninnescah, Tribune, and Wakefield, Kans.; Marquette, Mich.; Culbertson, De Soto, North Platte, and Omaha, Nebr.; Abilene, Cedar Hills, Cleburne, Comanche, Decatur, Fort Elliott, and Mesquite, Tex.; Deuster and La Crosse, Wis. 28th, Athens, Ga.; Fort Supply, Ind. T.; Cresco, Iowa; Globe, Salinas, and Wakefield, Kans.; Cedar Hill, Cleburne, Comanche, Corsicana, Gallinas, Galveston, Mesquite, New Ulm, Palestine, and San Antonio, Tex. 29th, Cairo, Ill.; Shreveport, La.; Portland, Me.; Dudley and Provincetown, Mass.; Fort Maginnis and Helena, Mont.; Antrim, N. H.; Moorestown, N. J.; Ardenia, Brooklyn, Fort Columbus, and Setauket, N. Y.; Brownsville, Corpus Christi, and Corsicana, Tex.; Middlebury, Vt.; Spokane Falls, Wash. 30th, Livingston, Ala.; Rapid City, Dak.; Sebastian, Fla.; Cornish, Gardiner, Kent's Hill, and Portland, Me.; Provincetown, Mass.; Poplar River, Mont.; Hay Springs, Nebr.; Concord, N. H.; Clayton and Moorestown, N. J.; Albany, Columbus, Cooperstown, Factoryville, Humphrey, Oswego, Palermo, Plattsburg Barracks, Palmyra, and Rose, N. Y.; Bellevue, College Hill, Jacksonborough, Ruggles, and West Milton, Ohio; Drifton, Pa.; Chattanooga, Tenn.; Middlebury, Saint Johnsbury, and Strafford, Vt.; Cheyenne, Wyo.

MISCELLANEOUS PHENOMENA.

DROUGHT.

Boisé City, Idaho, 20th: rain is much needed; grass is drying up and the cattle interests are suffering in consequence.

Springfield, Mo., 23d: the dry weather and brisk winds of the past fourteen days have been injurious to winter wheat.

Key West, Fla.: the rains of the 25th and 26th broke the drought which had prevailed on this island since the middle of December last; the only rain affording relief previously to the above dates was that of March 11th, which was of but slight benefit.

Yankton, Dak.: the rain of the 27th greatly benefited crops which were suffering from drought.

Decatur, Macon Co., Ill., 27th: throughout central Illinois drought has greatly injured the hay, wheat, and oat crops. Reports from Monticello, Piatt Co., state that the wheat crop has suffered to such an extent that much has been plowed up and the ground planted in corn.

Goshen, Elkhart Co., Ind., 27th: wheat and hay in this vicinity have been much injured by the drought.

Cairo, Ill., 27th: farmers from the surrounding country report that crops are suffering for rain.

Grand Haven, Mich., 27th: the prevailing dry weather is causing considerable injury to the spring crops.

University, Miss.: the low temperature and the deficiency in rainfall during the latter part of the month affected the growing crops injuriously throughout the state; light rain fell during the night of the 29–30th.

Fort Bidwell, Cal., 30th: the month has been very dry, the total rainfall being only 0.16 inch; much anxiety is felt by stockmen and farmers.

Lewis Creek, Tulare Co., Cal., 30th: the past month was the driest April for years.

Pekin, Tazewell Co., Ill.: at the end of the month the drought in this section had become very serious, but the rainfall of the 30th brought some relief.

Oswego, Kendall Co., Ill.: the rain, 0.55 inch, which fell on the 30th was of great benefit to small seed, and to crops in general, which were suffering for rain.

Butlerville, Jennings Co., Ind., 30th: the excessive dryness during the month has retarded the growth of grain, especially the late sown oats; it has also retarded sprouting of seed.

Beverly, Burlington, Co., N. J., 30th: rain is much needed in this section.

Augusta, Ga.: the total precipitation for the month, 0.87, inch, is the smallest amount recorded for April since the establishment of the Signal Service station in 1870. The deficiency of precipitation in this vicinity has been favorable to the planting of cotton, but has retarded early vegetation.

FOREST AND PRAIRIE FIRES.

Fort Sully, Dak.: prairie fires were burning on the Missouri River opposite this place on the 10th, and from the 12th to 14th they were burning in all directions about this place; extensive fires also occurred west of the station on the 21st.

Cape Henry, Va.: on account of forest fires west of station, this place was enveloped with dense smoke on the 29th and 30th.

Canajoharie, Montgomery Co., N. Y.: an extensive forest fire burned along the line of the New York Central Railroad on the 26th.

Forest and prairie fires were also reported during the month as follows: Las Animas and Pike's Peak, Colo., Fort Reno, Ind. T., and Topeka, Kans., 1st; Fort Sill, Ind. T., 1st to 7th, 14th, 15th; Valentine, Nebr., 4th; Huron, Dak., 7th; Fort Yates, Dak., 8th, 9th, 12th, 20th; Yankton, Dak., 13th; Moorhead, Minn., 13th, 18th to 20th, 24th to 29th; Fort Elliott, Tex., 14th; Poplar River, Mont., 15th, 19th, 24th, 30th; McMinnville, Oregon, and Rapid City, Dak., 20th to 25th; Fort Buford, Dak., 22d, 23d; Clayton, N. J., 25th, 28th; Wellsborough, Pa., 25th to 30th; Humphrey, N. Y., 28th to 30th.

HALOS.

Solar halos were reported every day during the month in some part of the country, except on the 21st, when none were

reported; they were least numerous on the 14th, 24th to 27th, and most numerous on the 1st, 5th, 7th, 13th, 17th to 19th, and 31st; they were observed on from ten to sixteen dates in the following states and territories: Cal., Dak., Me., N. Y., Oregon, and Wash.

Only a few lunar halos were reported from the 1st to 15th and on the 28th and 29th, but during the remainder of the month they were generally observed throughout the country, being most frequent on the 17th, 18th, 21st to 23d, and 25th; none were observed on the 5th, 7th, 8th, 27th, and 30th; they were most frequently observed in California and Oregon.

The phases of the moon, Washington mean time, during April, as given in "The American Ephemeris and Nautical Almanac," are as follows: last quarter, 2d, 19h. 33m.; new moon, 10th, 15h. 59.5m.; first quarter, 18th, 18h. 44.2m.; full moon, 25th, 13h. 14m.; apogee, 12th, 5.7h.; perigee, 25th, 15.7h.

METEORS.

Webster, Day Co., Dak.: a fine meteor was observed in the western sky at 7.30 p. m. on the 6th; it was apparently as large as Venus, of yellowish color, and left a long trail.

Dudley, Worcester Co., Mass.: a meteor was observed at 12.10 a. m., 7th; it started in the west about 20° from the zenith and moved southward, leaving a train of brilliant sparks.

Meteors were also observed as follows: 1st, Savannah, Ga. 4th, Beverly, N. J. 5th, Pekin, Ill. 6th, Voluntown, Conn., and Columbia, S. C. 7th, New Market, Ala. 8th, Huron, Dak. 9th, Nashua, N. H. 10th, Wauseon, Ohio. 13th, Manhattan, Kans.; Moorhead, Minn. 15th, Orono, Me. 16th, Cedar Keys and Duke, Fla. 18th, Parkston and Webster, Dak.; Cedar Keys, Fla.; Beverly, N. J. 19th, Red Bluff, Cal.; Manatee, Fla.; Kalamazoo, Mich. 22d, Parkston, Dak.; Utica, N. Y. 23d, Red Bluff, Cal. 26th, East Norway, Kans. 27th, Red Bluff, Cal. 28th, Fort Meade, Fla.; Indianapolis, Ind. 29th, Elkin, Ky.; College Hill, Ohio. 30th, Cedar Keys, Fla.

MIRAGE.

Fort Assinaboine, Mont.: from 9 a. m. to 12.30 p. m. on the 4th the banks of Milk River, distant twelve miles, and ordinarily not visible, were seen from this station.

San Diego, Cal.: on the 12th a beautiful mirage appeared in the southwest, showing the Coronada Islands very distinctly, the two islands being apparently connected by a large suspension bridge.

Parkston, Hutchinson Co., Dak.: an unusually fine mirage was observed on the 18th before sunrise; in some parts of the horizon objects appeared grotesquely elongated and several times their natural size; the images of cattle, distant several miles, were seen having gigantic proportions; also large lakes, with their shores dotted with trees and houses. The display ended at noon, and shortly afterwards the sky clouded over and rain and snow began to fall.

Toledo, Ohio: on the afternoon of the 27th the ice houses on Gard's Island and the light house on Turtle Island were plainly seen from Maumee Bay; two images of the light house appeared, one being inverted. The phenomenon lasted from 6.30 to 7.30 p. m.

Mirages also occurred as follows: Traverse City, Mich., 8th; Yuma, Ariz., 9th; Webster, Dak., 10th, 11th, 18th to 21st, 23d, 30th; Marquette, Mich., 18th to 20th; Duluth, Minn., 24th.

SAND STORMS.

Sand storms were reported as follows: Yuma, Ariz., 3d, 24th, 25th, 30th; Willcox, Ariz., 5th, 25th; Rio Grande City, Tex., 8th; San Carlos, Ariz., 13th; Lava, N. Mex., 16th; Fresno, Cal, 25th.

VERIFICATIONS.

INDICATIONS FOR 33 HOURS IN ADVANCE.

The percentages of verifications of the tri-daily indications for April, 1888, as determined from comparison of succeeding telegraphic reports, are given in the table below.

The predictions for all districts east of the Rocky Mountains for April, 1888, were made by 1st Lieutenant Robert Craig, 4th Artillery, U. S. Army, Acting Signal Officer and Assistant, except those for Minnesota and Dakota, which were made at Saint Paul, Minn., by 1st Lieutenant Thomas M. Woodruff, 5th Infantry, U. S. Army, Acting Signal Officer; those for the Pacific coast districts were made at San Francisco, Cal., by 2d Lieutenant J. E. Maxfield, Signal Corps; the verifications for all districts were determined by Junior Professor C. F. Marvin.

Percentages of indications verified, April, 1888.

States.		States.	
Maine	84.33	Kentucky	84.27
New Hampshire	79.97	Ohio	80.63
Vermont	80.63	West Virginia	79.77
Massachusetts	78.80	Indiana	82.83
Rhode Island	78.00	Illinois	80.53
Connecticut	79.60	Lower Michigan	80.93
Eastern New York	80.47	Upper Michigan	69.07
Western New York	76.17	Wisconsin	78.57
Eastern Pennsylvania	85.80	Minnesota*	79.67
Western Pennsylvania	76.93	Iowa	78.37
New Jersey	81.77	Kansas	81.10
Delaware	83.63	Nebraska	79.27
Maryland	82.20	Missouri	77.60
District of Columbia	83.33	Colorado	78.57
Virginia	79.53	Eastern and Southwestern Dakota*	79.47
North Carolina	78.53	Southern California*	79.87
South Carolina	81.87	Northern California*	80.93
Georgia	80.70	Oregon*	74.95
Eastern Florida	82.07	Washington Territory*	70.65
Western Florida	82.33	*By elements:*	
Alabama	83.53	Weather	83.43
Mississippi	81.00	Wind	77.36
Louisiana	80.80	Temperature	77.38
Texas	80.83		
Arkansas	77.60	General average	80.41
Tennessee	83.50		

* In determining the general average percentage for the different elements, Minnesota, Dakota, and the Pacific coast states have not been included.

CAUTIONARY SIGNALS.

Of the total number of cautionary and storm signals ordered during April, 1888, it was practicable to determine the justification or failure of thirty-two; justified, sixteen, or 50.00 per cent. Of the above, twenty were ordered for cautionary signals; number justified, thirteen, or 65.00 per cent. Twelve storm signals were ordered; justified, three, or 25.00 per cent. Total number of direction signals ordered, forty-seven; justified, forty-four, or 93.62 per cent. Number of signals ordered for easterly winds, twenty-four; justified, twenty-one, or 87.50 per cent. Number of signals ordered for westerly winds, twenty-three; all, or 100 per cent., of which were justified. Number of storms without signals, twenty-five. Number of signals ordered late, *i. e.*, after the justifying velocity had begun, one, or 3.12 per cent.

COLD-WAVE SIGNALS.

Total number of cold-wave signals ordered from Office Chief Signal Officer, sixty-two; justified, forty-one, or 66.13 per cent. Twenty-nine cold-wave signals were ordered during the month by the Signal Service Officer at Saint Paul, Minn., of which, fourteen, or 48.28 per cent., were justified.

LOCAL VERIFICATIONS.

The following extracts from the published reports of the state weather services for April, 1888, show the percentages of verification of weather and temperature signals for the various states:

Michigan.—Weather and temperature signals are now displayed in one hundred and forty towns in the state, and upon the baggage-cars of twenty-six trains of eight of the principal railroads of the state.

The indications and cold-wave warnings are issued by the Chief Signal Officer and distributed to the different stations through the central office. The indications are issued at 1 a. m., daily, from the Chief Signal Office, Washington, and are for the twenty-four hours from 7 a. m. to 7 a. m.

The percentage of verification of these indications for April is as follows (the verification is taken from reports of displaymen furnished this office monthly): temperature, 83.8 per cent; weather, 77.8 per cent.; temperature and weather, 80.8 per cent.

The percentage of verification of weather predictions for April on the D., G. H., and M. R'y, is 83.0 for weather, and 75.0 for temperature; on the C. & G. T. R'y, weather, 84.7, temperature, 79.3; P. H. & N. W. R'y, weather, 76.7, temperature, 85.0; M. C. R'y, weather, 75.0, temperature, 79.7; G. R. & I. R'y, weather, 80.0, temperature, 83.0; C. & W. M. R'y, weather, 78.7, temperature, 83.3; P. O. & P. A. R'y, weather, 78.0, temperature, 76.8.

Cold-wave warnings were issued by the Chief Signal Officer on the 10th at 11.55 a. m., and were partially justified, a majority of the stations reporting a fall of 20° by 7 a. m. of the 11th. An order was issued at 7 a. m. of the 29th (Sunday) and the temperature fell from 35° to 42° during the afternoon of the 29th. The temperature was high during the forenoon, reaching 75°, and by night had fallen to 38°.

Nebraska.—The percentages of correct predictions for the state are as follows: temperature; 89.6; weather, 93.1; mean, 91.4.

South Carolina.—The percentages of verifications of the weather and temperature predictions for the state was: weather, 91.3; temperature, 97.9.

Tennessee.—The percentages of verifications of weather and temperature predictions sent daily from the Signal Office at Washington to the various stations in the state were for the state: weather, 90.6 per cent.; temperature, 90.4 per cent.

STATE WEATHER SERVICES.

The following extracts are republished from reports for April, 1888, of the directors of the various state weather services:

The "Alabama Weather Service," P. H. Mell, jr., of the Agricultural and Mechanical College, Auburn, director:

With the exception of a few days that were cool, the month has been mild and pleasant. The average temperature was 3°.6 above the normal, and there was a deficiency of 3.83 inches of rain. The 15th is about as late as the last killing frost occurs in this section, but in some portions of the state it came this month on the 25th. On the 21st the minimum thermometer registered 42°, and a light frost was formed. There were no decidedly cold days, yet the weather was cool enough to injure the tender plants to a slight degree and retard their growth. Farming operations have progressed rapidly, and planting has been pressed with much vigor. Oats, rye, and other grains are well advanced in fruitage and promise well. A great deal of cotton is up, and the warm days towards the last of the month caused the young plant to grow with increased vigor. The deficiency of rain has given cause for serious apprehensions in some sections, but no damage has yet resulted.

Summary.

Temperature (in degrees Fahr.).—Monthly mean, 66.6; highest monthly mean, 71.9, at Newton; lowest monthly mean, 59.9, at Gadsden; absolute maximum, 89, at Troy, on 16th; absolute minimum, 30, at Evergreen, on the 1st; range for state, 59; greatest local monthly range, 58, at Evergreen; least local monthly range, 33, at Newton.

Precipitation, including melted snow (in inches).—Average for the state, 2.46; greatest, 4.70, at Eufaula; least, 9.96, at Pineapple.

Wind.—Prevailing direction, southeast.

The "Arkansas Weather Service;" Prof. John C. Branner, Little Rock, director:

Frosts were reported at Lead Hill, Portia, and Memphis, Tenn., on the 13th, and at Portia on the 30th; the one of the 13th was observed in the valleys only at Eureka Springs.

The rainfall was largely in excess throughout the western portions of the state, being at Fort Smith 2.40 inches greater than the average of five years; Washington, 1.15 inches above twenty years; Conway, 4.5 inches; Russellville, 2.70 inches; Eureka Springs, 1.02 inches, and at Alexander, 0.18 inch above the same month last year; while it was below the average of eight years at Little Rock, 4.28 inches; Lead Hill, 2.70 inches below seven years; Helena, 0.40 inch, and Osceola, 0.20 inch below April, 1887.

The "Monthly Review of the Illinois Weather Service," Col. Charles F. Mills, Springfield, director:

The rainfall in the state has been far below the average, so that the month just passed has been the driest April on record in the state. Only two general rains occurred during the month, on the 9th and 10th, and on the 29th and 30th. In fact less rain fell in this state during April than in any other state east of the Rocky Mountains, and as a consequence winter wheat has been considerably damaged, and farming operations have been generally retarded. The average rainfall for the month was only 1.83 inches, which was 1.94 inches below the average of the past ten years. The driest April previous to this was in 1879, when the average rainfall was 2.18 inches, which was over half an inch greater than the rainfall of the April just passed. The greatest deficiency, as compared with the average, was in the southern division, where the rainfall was below the average.

The "Indiana Weather Service," Prof. H. A. Huston, of Purdue University, Lafayette, director:

The rainfall during the month was deficient nearly everywhere, except at a few places in the central portion of the state, where the total amount was increased by heavy local rains during thunder-storms on the 5th and 10th. Snow fell at a few places in the northern portion, but the amount was small.

Summary.

Temperature (in degrees Fahr.).—Monthly mean, 53.1; highest monthly mean, 65.8, at Marengo; lowest monthly mean, 46.2, at La Grange; absolute maximum, 89.0, at Connersville, on the 29th; absolute minimum, 22.0, at La Grange, on the 3d; range for state, 67; greatest local monthly range, 63.0, at La Grange; least local monthly range, 44.0, at Dagonia Springs.

Precipitation, including melted snow (in inches).—Average for the state, 2.27; greatest, 4.13, at Marengo; least, 1.00, at Crawfordsville.

Wind.—Prevailing direction, north.

The "Kansas Weather Service," Prof. J. T. Lovewell, Topeka, director:

Temperature.—The mean temperature for the state is slightly above the April mean, except in the Verdigris Valley, where it is slightly below. In the counties bordering the Missouri River it is 3°.5 above the average. At Topeka it is .6° above, while in the Arkansas Valley it is from 2° to 4° above. The average temperature for the eastern division is 58°, for the middle, 57°, and for the western division, 55°; average for the state, 57°. The frost of the 29th and 30th was general, and was severe, doing much damage to gardens and some to vineyards.

Precipitation.—The average precipitation for the state is 2.89; for the eastern division, 3.13; for the middle division, 1.17, and for the western division, 4.37. Of the total amount fallen in the state, the eastern division received 36 per cent., the middle division 14 per cent., and the western 50 per cent. In Johnson county the rainfall was about the April average. Proceeding south and southwest of Johnson there is an excess, which increases until the Verdigris Valley is reached, where it is from 2.70 to 3.10 inches in excess; it then diminishes slightly until the Ninnescah Valley is reached, but rapidly increases to the west again, being 2.50 above the normal in Ford county. There is a large deficiency in the counties bordering on the Missouri River, amounting to over an inch. In Douglas county a deficiency occurs, amounting to .61 at Lawrence. This deficiency rapidly increases westward, and at Topeka amounts to 1.31; it culminates in the contiguous portions of Mitchell, Osborne, Russell, and Lincoln counties, where less than two-tenths of an inch of rain fell during the entire month. The deficiency rapidly diminishes to the west again, there being an excess in the extreme western counties.

Summary.

Temperature (in degrees Fahr.).—Monthly mean for the state, 57; highest monthly mean, 61, at Sedan; lowest monthly mean, 53, at Eustice and Tribune; absolute maximum, 101, at Halstead, on the 22d; absolute minimum, 20, at Montero, on the 9th; range for state, 81; greatest local monthly range, 73, at Halstead; least local monthly range, 49, at Waterville; greatest daily range, 52, at Gibson and Tribune, on the 16th; least daily range, 0, at Rome on the 8th.

Precipitation, including melted snow (in inches).—Average for the state, 2.89; greatest, 10.20, at McAllister; least, .20, at Cawker City.

Wind.—Prevailing direction, south.

The "Louisiana State Weather Service," in charge of R. E. Kerkam, Sergeant, Signal Corps, at New Orleans:

The marked meteorological features of April, 1888, were the high average monthly temperatures, the great deficiency in the average rainfall, the absence of high winds, and the comparatively few thunder-storms.

The average rainfall for the past month for the state was 1.78 inches, being a deficiency of 4.10 inches, compared with a normal covering the past twenty years. There were but two years during that period when the average was less than during the past month, viz., 1873, 1.72 inches, and 1887, 1.30 inches. The greatest April average is recorded in 1874, when 15.50 inches fell. In 1880 an average of 10.12 inches is recorded. The average for the northern section during the past month was 2.02 inches, against an April normal of 6.31 inches, being a deficiency of 4.29 inches for the month. In the southern section of the state the average for the past month was 1.55 inches, the normal April rainfall for that section being 5.32.

The "Michigan Weather Service," N. B. Conger, Sergeant, Signal Corps, Lansing, director:

Temperature (in degrees Fahr.).—The mean temperature for April, 41.6, is 2.9 below the normal of thirteen years. The temperature was below the normal in all sections during April. The greatest deviation, 3.4, was for the Upper Peninsula, and the least was 1.3 below the normal in the northern section. The mean daily temperature was below the normal on twenty days and above on nine days. The highest mean daily temperature, 67, occurred on the 27th, when the temperature was 18 above the normal, and the lowest, 32, occurred on the 2d, when the temperature was 2 below the normal. The highest mean daily temperature, 67, for the past thirteen years occurred on April 27, 1888, and the lowest, 21, occurred on April 1 and 5, 1888. The highest mean monthly temperature, 52.7, occurred in April, 1878, and the lowest, 40.6, occurred in April, 1881. The maximum temperature, 90,

occurred at Evart on the 27th, and at Omer on the 28th, and the lowest, —12.8, occurred at Sault Sainte Marie on the 3d. Two stations report a temperature below zero during the month, viz.: Sault Sainte Marie and Gaylord, on the 3d. The extreme range for the state was 102.8.

Precipitation, including melted snow (in inches).—The average amount of precipitation for April, 1.92, is 0.60 below the normal of thirteen years. The precipitation was below the normal in all sections, except the Upper Peninsula, where an excess of 1.76 occurred. The precipitation at Marquette, 5.07, is 3.43 above the normal at that station. The greatest deficiency, 0.81, occurred in the southern section. No rain was recorded in the southern section from the 19th to the 29th, a period of ten days. Comparing the average precipitation of this month with the records of thirteen years it is found that the greatest average precipitation, 5.65, occurred in 1880, and the least, 1.38, occurred in 1879. A very heavy rain storm, accompanied by hail, is reported at Adrian on the 5th, with 1.50 inches of rain in ten minutes.

Summary.

Temperature (in degrees Fahr.).—Monthly mean, 41.6; highest monthly mean, 47.8, at Bronson; lowest, 32.0, at Sault Sainte Marie; absolute maximum, 90.0, at Evart and Omer, on the 27–28th; absolute minimum, —12.8, at Sault Sainte Marie, on the 3d; range for state, 102.8; greatest local monthly range, 83.8, at Sault Sainte Marie; least, 46.0, at Pontiac; greatest daily range, 51.5, at Sault Sainte Marie, on the 3d; least, 3.0, at Detroit and Ovid, on the 15th, and Port Huron on the 24th.

Precipitation, including melted snow (in inches).—Average for the state, 1.92; greatest, 5.07, at Marquette; least, 0.80, at Albion.

Wind.—Prevailing direction, northwest.

The "Minnesota Weather Service," Prof. W. W. Payne, Northfield, director:

Temperature.—During the month of April the weather was considerably colder than the average, ranging from a few tenths of a degree below the normal in the extreme northwestern portion of the state to over 5° below in the vicinity of Saint Paul. At La Crosse the departure was about 4° below the normal, while at Moorhead and Duluth it was only 2° below. The average temperature for the state was 39.3, this was respectively, 2°.9, 8°.6, and 4°.8 colder than the corresponding months of 1885, 1886, and 1887. The coldest periods of the month were: 1st to 3d, 6th, 7th, 12th, 19th; the lowest temperatures occurred generally during the first of these periods. The minimum for the month was 4°.0 below zero, reported from Argyle on the 2d; this is the only station reporting a temperature below zero. Other stations that recorded low temperatures were: Pokegama Falls Dam, 1°.0, 7th; Morris, 4°.0, 2d; Saint Vincent, 5°.8, 2d and 6th. The warmest periods of the month were: 9th, 10th, 13th to 17th, 23d to 27th; the maximum temperatures were generally recorded during the last of these periods. The highest was 82°.0, on the 26th and 27th, at Tracy; 80°.0, at Farmington, on the 26th, and at Canby on the 21st. The range of temperature for the state was 86°.0. The greatest range for any station was 78°.1, at Argyle; the least range was 48°.2, at LaCrosse.

Precipitation.—The rainfall has been greater in the southern than in the northern part of the state. The greatest precipitation on any one day was on the 28th, when Minneapolis reported 2.22 inches. The greatest for the month, 5.19 inches, was reported from Mankato. General precipitations occurred on the 4th, 5th, 9th, 10th, 17th, 22d, and rainfall was reported from nearly all stations from the 26th to 29th, inclusive. In no case was the monthly precipitation less than one inch, the least amount reported being 1.06, at Saint Vincent. Stations having over five inches of rainfall were: Minneapolis, 5.12; Saint Paul, 5.14; and Mankato, 5.19. On five days, the 12th, 13th, 14th, 19th, and 21st, no precipitation was reported, and on the 15th the amount was inappreciable. Nearly all of the precipitation was in the form of rain, although 4.60 inches of snow fell at Argyle during the month, and 4.00 inches was reported at Farmington and Le Sueur. Canby was the only station reporting snow on the ground at end of month, and the amount there was only 1.00 inch. The average precipitation over the state for the month, including melted snow, was 3.06. This was 0.83 above the amount for the corresponding month of last year, 0.54 below that for April, 1886, and 0.57 above the amount reported for April, 1885. The departures from the normal of the past fifteen years' observations at La Crosse and Saint Paul are above the average, while at Duluth, Moorhead, and Saint Vincent the precipitation was below the average. The excess at La Crosse was 1.29, and at Saint Paul 2.89, the latter place having more than twice the usual amount. Duluth had a deficiency of 0.24; Moorhead, 0.95, and Saint Vincent, 0.16.

Wind.—The prevailing direction for the month was from the northwest.

The "Mississippi Weather Service," Prof. R. B. Fulton, of the University of Mississippi, Oxford, director:

The monthly mean temperature, 68°, is 2° in excess of the mean for the corresponding month of last year. Two cool waves occurred during the month, the first on the 13th and the second on the 21st; light frosts occurred in some localities on these dates.

Temperature (in degrees Fahr.).—Monthly mean, 68; highest monthly mean, 71, at Tupelo and Lake; lowest monthly mean, 66, at Batesville, Hernando, Holly Springs, and University; absolute maximum, 92, at Columbus, on the 17th; absolute minimum, 34, at Columbus, on the 13th; range for state, 58; greatest local monthly range, 58, at Columbus; least local monthly range, 26, at Tupelo; greatest daily range, 36, at Vicksburg, on the 22d; least daily range, 2, on the 5th, at Lamar.

Precipitation, including melted snow (in inches).—Average for the state, 1.57, is .25 less than the average amount for April, 1887; greatest, 5.54, at Port Gibson; least, 0.09, at Hazelhurst; average number of days on which rain fell, 4.

The "Missouri Weather Service," Prof. Francis E. Nipher, of Washington University, Saint Louis, director:

Temperature (in degrees Fahr.).—The average for April was 57.5; the highest reported was 94, at Pro Tem; the lowest was 20, at Mound City; the average of maximum temperatures was 86.4, and the average of minimum temperatures was 30.5, making an average monthly range of 55.9.

Precipitation, including melted snow (in inches).—The average precipitation was 1.79 inches, which was 1.36 inches below the normal for April. The greatest amount reported was 3.27 inches at Lamar, and the least was 0.80 inches at Ozark.

The "Nebraska Weather Service," Prof. Goodwin D. Swezey, of Doane College, Crete, director:

The month has been on the whole decidedly warm, with about the average amount of rainfall; but following a cold and wet March, the spring in many parts of the state is not as far advanced as usual.

Temperature.—The mean of the month for southeastern Nebraska is 56°.6, which is higher than for ten Aprils past, and about 6° higher than their mean; the extreme temperature, 88°.9 and 21°, are both about normal.

Precipitation.—The rainfall over the state reached a maximum of 6 inches in Kearney county, and there is a gradual falling off to the southeast and northwest, being less than 2 inches in the southeastern counties, and less than an inch in the northwest. The average for the whole state is 2.04 inches.

The "Nevada Weather Service," Prof. Charles W. Friend, Carson City, director:

Both pressure and temperature for April were considerably above the normal. The highest temperature reported, 90°, occurred at Elko on the 20th, and the lowest, 14°, also occurred at Elko on the 5th. The highest temperature occurred generally throughout the state from the 20th to the 21st, and the lowest from the 4th to the 5th, except in the central part of the state, where it occurred from the 23d to the 25th.

The rainfall for April was generally light, much below the average. Light rains occurred in the eastern part of the state from the 1st to the 10th, and rain and snow throughout the whole state from the 22d to the 25th. The rainfall appears to have been equal to the average over a small area in the vicinity of the Humboldt River in Elko county. Generally, however, April was characterized by high temperature, extreme dryness, light winds, and an almost cloudless sky. Agricultural and grazing interests have suffered serious loss and inconvenience from the long-continued drought. At Carson City, the deficiency of precipitation since January 1, 1888, is 4.19 inches, which is more than a third of the average annual amount; and since September 1, 1887, the deficiency is 5.97 inches.

Summary.

Temperature (in degrees Fahr.).—The mean temperature for the month was 53.3, or 5.6 above the normal. The highest temperature, 86.3, occurred on the 21st; the lowest, 19.3, on the 5th; range for the month, 67.

Precipitation (in inches).—The total precipitation was 0.20, or 1.33 below the normal.

Wind.—Prevailing directions, northwest and southwest.

The "New England Meteorological Society," Prof. Wm. H. Niles, of the Institute of Technology, Boston, Massachusetts, president:

General conditions.—The month is most conveniently described by noting the cyclones whose passage over or near New England dominated the weather. These were eight in number. (1) On the 1st a depression approached from the west and crossed New England on the 2d, with central pressure 29.5 inches. General rain or snow began on the 1st and ended on the 3d. The 4th was clear, with high pressures and temperatures above freezing. (2d) On the 5th a cyclone approached from the Lakes, which, on the 6th, with central pressure 29.6 inches, crossed the Northern States, and caused rains until the 7th. The following anti-cyclone, with pressure 30.5 inches, gave cool, clear weather until the 10th. (3) A cyclone with central pressure, 29.5 inches on the 11th, passed from the Lakes northeasterly into Canada, while a subordinate centre moved from the Connecticut coast into the Atlantic. Rain and snow fell generally from the 10th to the 12th. (4) On the 13th a cyclone, with central pressure 29.7, approached the district from the northwest, crossing it on the 14th. The precipitation was light and not general over the whole district between the 13th and 15th. On the 16th and 17th fair weather prevailed. (5) A cyclone moving far north of New England on the 18th caused local rains on that date. (6) A depression east of Virginia on the 20th moved in the ocean sufficiently near the coast to cause general rain in the southern part of New England, and local rain or snow in the northern part on the 20th and 21st. (7) On the 23d a cyclone of increasing intensity, which had reached the Virginia coast from the west, passed by New England in the Atlantic, causing rains, especially in the southern portion, from the 22d to the 24th. High pressures, with very warm, fair weather, followed until the 29th. (8) A depression which had developed in the southwest moved into the ocean south of the district on the 30th, and local rains attendant upon it were reported on the 29th and 30th.

Atmospheric pressure (in inches).—Monthly mean, 30.07 (fifteen stations);

maximum observed, 30.56, at New Haven, on the 26th; minimum observed, 29.43, at Blue Hill, on the 2d; range for New England, 1.13; greatest local monthly range, 1.11, at Blue Hill; least local monthly range, 0.96, at Northfield.

Temperature (*in degrees Fahr.*).—Monthly mean, 40.1 (ninety-five stations); highest monthly mean, 45.0, at New London; lowest monthly mean, 31.8, at Berlin Falls; maximum, 89, at Northampton, on the 29th; minimum, —5, at Berlin Falls, on the 9th; range for New England, 94; greatest local monthly range, 81, at Strafford; least local monthly range, 35, at Nantucket; greatest daily range, 54, at Lake Cochituate, on the 28th; least daily range, 2, at Lunenburg, on the 24th.

Precipitation, including melted snow (*in inches*).—Average for New England, 2.70 (one hundred and seventeen stations); greatest, 4.97, at Jacksonville; least, 0.90, at Lunenburg.

Wind.—Prevailing direction, northwest (twenty-two stations).

The "New Jersey Weather Service," Prof. George H. Cook, of the Agricultural College, New Brunswick, director:

The mean temperature of the state for the month, as compared with the normals determined from past records of twenty-nine stations, was found to be 0°.5 above the mean. It was below the average until the 26th, when it rose at once to summer heat. On the 29th and 30th several stations recorded 90°.0, 91°.0, 91°.5, and 92°.0, respectively, which is the highest recorded, according to Mr. P. V. Spader's records, since April, 1861.

The average rainfall for the state, 3.28 inches, shows a deficiency for the month of 0.65 inch.

Temperature (*in degrees Fahr.*).—Monthly mean, 47.9; highest monthly mean, 51.3, at Bridgeton; lowest, 44.8, at Hanover; absolute maximum, 92.0; at Tenafly, on the 29th; absolute minimum, 22.0, at Tenafly, on the 25th; range for state, 70.0; greatest local monthly range, 70.0, at Tenafly; least, 38.0, at Ocean City; greatest daily range, 47.0, at Tenafly and Bordentown, on the 28th; least, 3.0, at Paterson, on the 18th.

Precipitation, including melted snow (*in inches*).—Average for the state, 3.28; greatest, 4.68, at New Brunswick; least, 1.89, at Beverly.

Wind.—Prevailing direction, northwest.

The "North Carolina Weather Service," Dr. Herbert Battle, of Raleigh, director:

Temperature (*in degrees Fahr.*).—Monthly mean, 59.6; normal, 57.5; departure from the normal, +2.1; average monthly range, 52.4; mean daily range, 23.2; greatest monthly range, 61.0, occurred at Salem; lowest monthly range, 36.8, occurred at Southport; greatest mean daily range, 30.0, occurred at Salem; least mean daily range, 15.0, occurred at Southport; highest monthly mean, 63.6, occurred at Chattanooga, Tenn.; lowest monthly mean, 53.0, occurred at Salem.

Precipitation, including melted snow (*in inches*).—Average, 1.83; normal, 4.51; departure from the normal, —2.68; greatest, 4.43, occurred at Chattanooga, Tenn.; least, 0.46, occurred at Davidson College.

Wind.—Prevailing direction, southwest.

The "Ohio Meteorological Bureau," Prof. B. F. Thomas, of the Ohio State University, Columbus, president; Charles E. Kilbourne, Secretary:

Temperature (*in degrees Fahr.*).—The mean temperature for the northern section, 45.9, is 6.0, and that of the middle section, 49.5, is 0.1 below the average; the mean for the southern section, 52.6, is 0.4 above the average; the mean for the state was 49.2, which is 0.2 below the mean for the past six years; the highest temperature, 92.0, occurred at Pomeroy, on the 29th; the same temperature was recorded at Portsmouth, April 23, 1885; it is the maximum for April since the opening of the bureau; the minimum for the month was 19.0, at Wooster, on the 12th; the mean daily range was 24.0; the greatest range was 49.0, at Youngstown, on the 28th; least, 5.6, at Cleveland (S. O.), on the 20th.

Precipitation, including melted snow (*in inches*).—Precipitation was general throughout the state on the 2d, 5th, 10th, 15th, 18th, 19th, and 30th. Local rains occurred in the northern section on the 1st, 9th, 11th, 12th, 13th, 20th, 21st, and 22d, in the middle section on the 6th, 9th, 21st, and 22d, and in the southern section on the 6th, 9th, 20th, 22d, and 23d. The mean rainfall in the northern section was 1.99; in the middle section, 1.97; and in the southern section, 2.02. The mean for the state was 1.99. These means are all below the average for the past six years, the deficiency in the northern section being 0.20, in the middle section, 0.78, and in the southern section, 1.50. The mean for the state was 0.83 below the average, making the deficiency for the year to May 1 2.01.

"Oregon Weather Service," report prepared by B. S. Pague, Sergeant, Signal Corps, Roseburg, Oregon:

The marked characteristics of April was its abnormally high temperature, deficiency in precipitation, and great number of clear or fair days.

Temperature.—The mean temperature of the state for April was 52°.2, which is about 3° above the April normal. Along the immediate coast the temperature was nearly normal, the mean being 49°; in the Willamette Valley it was above the normal from 3° to 5°, the mean being 52°.9; in the Umpqua Valley the mean was 56°, which is 5° above the normal; in the Rogue River Valley the mean was 55°.6, which is 6° above the normal; in the Lake country the mean was 48°.8, being 3°.9 above the normal; and in eastern Oregon the mean was 55.2°, which is 3° above the normal. Walla Walla had the highest mean temperature, 58°, and Fort Klamath the lowest mean, 45°.6.

Precipitation (*in inches*).—The precipitation was most decidedly below the normal in all sections of the state, except near the mouth of the Columbia River, where it was only slightly below the normal. Comparatively speaking, the greatest deficiency occurred in the lake country. Bandon has the greatest deficiency and La Grande the least. For the season from July 1, 1887, to May 1, 1888, the precipitation remains below the normal in all sections, except at Walla Walla, where it is .16 above the normal.

The "Pennsylvania State Weather Service," report prepared under the direction of the Franklin Institute, Philadelphia, by Sergeant T. F. Townsend, Signal Corps:

Temperature (*in degrees Fahr.*).—The average temperature for April, 1888, deduced from the tri-daily observations was 46.5, which is normal. Found from the mean maximum and mean minimum, it was 47.2, which differs only seven-tenths from the normal. A deficiency of heat existed until the latter part of the month, when the extreme high temperature of the 27th, 28th, 29th, and 30th brought it up to the monthly average. Owing to the low temperatures of January, February, and March, a deficiency for the year existed at the close of the month, which made the season some ten days behind that of former years. The first week in the month was comparatively warm, but was followed by cold, which continued until the 26th. The highest temperatures were recorded on the 29th and 30th, and averaged 88.2, the extreme being 92 at York. This is probably the warmest April weather ever recorded in Pennsylvania. The lowest temperatures were Bethlehem, 12; Coudersport, 15; Lock Haven, 15; Grampian Hills, 16; Eagles Mere, 16, and Bernice, 17. Most of the low temperatures occurred on the 8th, 9th, 13th, and 25th.

Precipitation, including melted snow (*in inches*).—The rainfall was quite evenly distributed, and averaged 2.52 inches for the state, which is a deficiency of nearly half an inch. Most of it fell during the middle of the month. The latter part of the month was quite dry. The heaviest rainfalls were on the 5th and 10th, and were attended by thunder-storms, which were severe and general throughout the state on the 5th, several of the observers reporting damage by lightning. Snow fell at many stations during the storms of the 14th and 16th, the greatest amounts being north and east of the Susquehanna, River. The following are the largest totals for the month: Eagles Mere, 8.7; Bernice, 7.3; Dyberry, 6.5; Wellsborough, 6; Coudersport, 4.7; and Montrose, 4.5. Many of the western stations had only "ground slightly covered" at any time during the month.

Wind.—Prevailing direction, northwest.

The "South Carolina Weather Service," Hon. A. P. Butler, Com'r of Agriculture for South Carolina, Columbia, director:

In a number of places throughout the state but little rain has fallen, the smallest amount being at Saint Matthews, where a little over a quarter of an inch fell. The greatest amount of precipitation occurred in the north and northeastern portion of the state, the greatest fall being at Greenville, 2.72. The mean rainfall for the state, 1.33, is 0.75 less than for April, 1887.

The mean temperature was 64°.6, 2°.3 higher than for April, 1887.

The following is an extract from the report of the "Meteorological Department of the State (Tennessee) Board of Health," prepared under direction of J. D. Plunket, M. D., President of the State Board of Health, by H. C. Bate, Signal Corps, Assistant, Nashville:

The meteorological features of April were the severe electric storms of the 9th and 22d in the middle division, the small proportion of rain-fall during the second decade, and the small percentage of cloudiness.

The mean temperature was 61°.4, nearly three degrees above the April mean for the past six years, and the highest during that period. The highest local mean was 66°, recorded at Memphis, and the lowest, 57°.5, recorded at Fostoria. The maximum temperature was 88°, recorded on the 5th, and was the lowest April maximum recorded during the past six years, except in 1884, and it was five degrees below the highest maximum during that period. The minimum temperature recorded was 30°, on the 21st and 22d, at four different stations, and was the highest April minimum during the period named, the next highest being 25°, in 1884, and the lowest 20°, in 1883 and 1886. The days of maximum temperature were the 5th and 29th in the eastern division, the 17th in the middle division, and the 4th, 5th, and 17th in the western division. The minimum temperature was recorded, with one or two exceptions, on the 21st. The daily ranges of temperature were about the normal.

The mean precipitation was 3.14 inches, nearly one inch less than the April mean for the past six years. Of this amount, the eastern and middle divisions received an average of about three and a half inches, and the western division about half that amount. The greatest rainfall occurred on the 9th, and it was particularly heavy in the eastern and middle divisions, where much injury was done to plowed land by washing and by packing it hard, and to fences along the water courses. The heaviest local rain of that date was at Beech Grove, where a fall of 3.27 inches was recorded. Other heavy local falls were recorded on that date in some portions of the middle division, and the day following in the eastern division. From the 11th to the 21st, inclusive, there was little or no rainfall in the state, except at one or two stations on the 18th and 19th. This drought immediately following the heavy rain of the 9th, coupled with almost uninterrupted sunshine, was severely felt in many portions of the state. The rain of the 9th was in many places accompanied by one of the severest electric storms ever witnessed. The greatest monthly rainfall was 4.72 inches, reported at Beech Grove, and the least, 1.15 inches, reported at Memphis.

Table of miscellaneous meteorological data for April, 1888—Signal Service observations.

Stations and districts.	Elevation above sea-level, feet.	Atmospheric pressure, in inches and hundredths.							Temperature of the air, in degrees Fahrenheit.														Mean relative humidity, per cent.	Mean temperature of dew-point, Fahrenheit.	Precipitation, in inches.		Winds.					
		Mean actual barometer.	Departure from normal.	Mean reduced barometer.	Extremes.				Monthly mean.	Departure from normal.	Extremes.				Monthly range.	Daily ranges.										Departure from normal precipitation, in inches.	Total movement, miles.	Prevailing direction.	Maximum velocity.		Date.	No. of rainy days.	No. of cloudy days.	No. of fair days.	No. of clear days.
					Highest barometer.	Date.	Lowest barometer.	Date.			Max.	Date.	Mean max.	Min.	Date.	Mean min.		Greatest.	Date.	Least.	Date.								Miles p. h.	Direction.					
New England.																																
Eastport	53	29.96	+ .13	30.02	30.48	26	29.49	21	0.99	36.5	— 1.5	55.6	28	42.9	12.9	8	29.7	42.7	22.2	7	5.7	30	68.3	36.1	2.01	— 1.56	6,441	nw.	34	e.	11	13	10	9	11
Portland	99	29.94	+ .13	30.05	30.49	26	29.52	2	0.97	39.2	— 4.8	64.5	28	46.1	15.5	8	30.5	49.0	28.2	26	3.8	11	66.3	27.6	3.80	+ 0.74	5,024	nw.	32	e.	11	11	8	13	9
Manchester	247	29.80	.....	30.08	30.53	26	29.56	2	0.97	40.4	— 5.6	81.0	28	49.5	16.8	8	30.7	64.2	40.2	28	7.5	11	59.1	25.2	2.60	.....	4,696	nw.	26	nw.	17	12	5	14	11
Northfield	871	29.11	.....	30.08	30.54	26	29.58	2	0.96	35.0	— 3.0	77.0	29	44.7	7.9	9	26.3	69.1	40.8	28	5.1	21	67.1	23.8	2.87	.....	6,315	s.	42	sw.	18	15	8	12	10
Boston	125	29.95	+ .15	30.01	30.54	26	29.57	2	0.97	42.2	— 1.8	66.0	28	50.5	20.8	8	34.6	45.2	28.1	26	7.4	2	59.2	27.1	2.04	— 1.76	8,205	w.	42	w.	7	13	7	11	12
Edgartown	.....	.....	.....	.....	.....	.....	.....	.....	.....	42.2	.....	64.0	30	50.9	25.0	8	33.4	39.0	26.8	27	11.7	19	.....	.....	1.46	.....	.....	sw.	.....	.....	.....	15	.....	.....	.....
Nantucket	14	30.05	.....	30.09	30.54	26	29.52	2	1.02	41.8	— 2.2	62.0	30	48.2	26.9	9	35.7	35.1	20.5	26	8.5	16	85.3	37.4	1.43	.....	6,695	w.	35	s.	11	12	6	11	13
Wood's Holl	22	30.06	.....	30.06	30.55	26	29.52	2	1.03	41.3	— 3.7	61.1	27	47.4	24.4	9	35.6	36.7	19.8	27	5.8	18	72.1	32.1	1.69	— 2.95	9,893	sw.	46	sw.	22	11	4	14	12
Vineyard Haven	.....	.....	.....	.....	.....	.....	.....	.....	.....	44.5	.....	65.5	30	53.5	24.7	8	35.5	40.8	28.6	11	12.2	20	.....	.....	0.91	.....	.....	sw.	.....	.....	16	.....	.....	.....	.....
Block Island	26	30.06	+ .14	30.09	30.56	26	29.53	2	1.03	41.1	— 2.9	60.0	28	47.0	26.9	9	35.5	33.1	18.0	26	4.7	23	77.6	33.9	1.35	— 2.04	9,646	nw.	39	se.	11	11	5	15	10
Narragansett Pier	.....	.....	.....	.....	.....	.....	.....	.....	.....	42.5	.....	65.0	28	51.7	22.0	9	33.3	43.0	27.0	28	10.0	18	.....	.....	2.56	— 0.80	.....	sw.	.....	.....	10	.....	.....	.....
New Haven	107	29.98	+ .13	30.10	30.56	26	29.55	2	1.01	44.0	— 2.0	77.5	29	51.8	25.4	8	34.8	52.1	32.9	28	5.9	18	68.1	33.2	2.57	— 1.31	5,463	nw.	30	w.	7	10	6	14	9
New London	47	30.03	+ .11	30.08	30.53	26	29.53	2	1.00	44.6	— 1.4	68.0	29	52.6	26.5	9	37.3	41.5	25.0	26	6.0	20	71.7	35.0	2.26	— 1.58	5,309	nw.	36	se.	11	10	5	11	14
Mid. Atlantic States.										60.7	— 0.6														2.00	— 1.49								
Albany	85	30.00	+ .13	30.10	30.55	26	29.52	2	1.03	43.6	— 3.4	87.7	29	52.9	22.0	8	34.1	65.7	38.0	27	8.4	14	61.0	29.2	1.95	— 0.90	4,600	nw.	35	s.	18	16	6	16	8
New York City	185	29.91	+ .13	30.11	30.56	26	29.58	2	0.96	47.9	— 0.1	84.2	29	57.3	29.2	13	39.4	55.0	35.2	28	10.2	10	62.6	34.8	3.57	+ 0.28	7,440	w.	52	se.	5	11	5	11	14
Philadelphia	117	30.01	+ .15	30.13	30.59	26	29.57	2	1.02	50.7	+ 0.7	90.7	30	60.3	31.0	13	41.8	59.7	33.6	28	8.0	20	53.1	32.8	2.10	— 0.82	7,751	nw.	37	nw.	14	8	6	10	14
Atlantic City	34	30.10	+ .16	30.13	30.59	26	29.57	2	1.02	45.9	— 1.1	74.3	6	54.6	30.3	25	38.6	44.0	34.5	2	4.5	23	74.1	37.6	2.96	— 0.37	7,275	s.	36	se.	10	8	3	13	14
Baltimore	45	30.09	+ .14	30.13	30.60	26	29.57	2	1.03	52.6	— 0.4	90.0	29	62.0	32.8	13	43.2	57.2	33.8	2	10.1	11	50.3	32.6	2.11	— 1.86	4,736	nw.	38	nw.	14	9	2	17	11
Washington City	100	30.03	+ .14	30.15	30.62	26	29.58	2	1.04	52.9	+ 0.9	89.0	29	64.4	31.8	13	42.4	57.2	38.2	27	12.4	11	59.2	37.3	1.89	— 1.02	5,147	nw.	33	nw.	14	9	2	15	13
Cape Henry	.....	.....	.....	.....	.....	.....	.....	.....	.....	53.6	.....	92.0	30	65.4	34.8	16	41.9	57.2	37.8	30	9.0	23	.....	.....	0.77	— 3.99	.....	nw.	.....	.....	.....	6	.....	.....	.....
Lynchburg	652	29.44	+ .14	30.14	30.62	26	29.66	2	0.96	50.3	+ 0.3	88.9	9	69.0	31.3	25	43.2	57.6	43.8	27	11.2	23	53.8	37.1	1.67	— 1.81	2,903	nw.	26	w.	14	7	4	9	17
Norfolk	69	30.08	+ .11	30.15	30.63	26	29.64	2	0.99	55.4	— 0.6	93.1	30	66.4	32.2	21	44.3	60.9	38.1	18	7.5	30	68.7	44.1	0.97	— 2.92	5,002	ne.	32	nw.	16	8	4	8	18
S. Atlantic States.										53.8	+ 1.5														1.10	— 2.68								
Charlotte	808	29.31	+ .15	30.15	30.63	26	29.75	2	0.88	63.2	+ 4.2	91.0	29	75.5	38.3	25	51.1	52.7	34.9	14	13.2	10	51.5	42.3	2.36	— 1.82	4,080	sw.	30	ne.	19	7	4	13	13
Hatteras	12	30.19	+ .20	30.21	30.64	26	29.78	2	0.86	57.3	+ 0.3	74.8	29	64.0	41.0	13	49.8	33.8	24.3	29	0.0	2	80.2	51.1	0.77	— 4.35	10,444	s.	46	n.	13	6	2	9	19
Kitty Hawk	.....	.....	.....	.....	.....	.....	.....	.....	.....	57.7	.....	92.0	30	68.4	39.4	21	47.0	52.6	39.3	29	9.2	12	.....	.....	1.17	— 4.13	.....	ne.	.....	.....	12	.....	.....	.....	.....
Raleigh	375	29.76	.....	30.16	30.62	26	29.73	2	0.89	59.1	+ 1.1	89.7	29	70.4	35.0	26	47.6	54.7	38.7	29	8.8	30	68.2	47.7	1.71	.....	4,866	nw.	27	n.	16	5	4	9	17
Southport	.....	.....	.....	.....	.....	.....	.....	.....	.....	61.5	.....	77.0	29	69.2	40.2	26	53.9	36.8	25.1	21	8.0	2	.....	.....	1.41	— 0.81	.....	sw.	.....	.....	.....	5	.....	.....	.....
Wash Woods	.....	.....	.....	.....	.....	.....	.....	.....	.....	54.3	.....	90.4	30	63.7	37.8	26	44.9	52.6	39.6	30	7.0	4	.....	.....	0.27	— 2.24	.....	e.	.....	.....	.....	7	.....	.....	.....
Wilmington	52	30.11	+ .15	30.17	30.62	26	29.76	2	0.86	61.7	+ 0.7	87.5	30	72.0	37.3	26	51.7	50.2	32.2	27	12.2	10	75.2	53.3	1.10	— 2.27	6,085	sw.	28	sw.	10	6	6	9	15
Charleston	52	30.11	+ .13	30.16	30.56	26	29.81	2	0.75	65.6	+ 1.6	88.0	30	74.7	50.0	21	58.9	38.0	28.4	29	8.3	9	76.2	56.9	1.38	— 3.02	7,105	sw.	36	ne.	17	8	5	10	15
Columbia	.....	.....	.....	.....	.....	.....	.....	.....	.....	66.1	.....	90.0	29	76.6	41.2	25	54.5	48.8	36.7	29	14.0	10	63.8	52.4	0.91	.....	.....	.....	.....	.....	.....	.....	6	3	8	19
Augusta	183	29.98	+ .14	30.17	30.60	26	29.84	2	0.76	66.4	+ 2.4	90.7	29	79.7	43.0	27	54.8	47.7	41.1	29	15.0	4	63.4	51.7	0.87	— 3.23	3,143	s.	24	n.	24	2	6	10	14
Savannah	87	30.07	+ .12	30.16	30.54	26	29.87	23	0.67	66.6	+ 0.6	88.1	30	76.8	47.8	22	58.1	40.3	36.7	29	10.2	4	69.4	54.7	0.71	— 3.53	5,999	e.	28	e.	9	4	3	12	15
Jacksonville	43	30.10	+ .10	30.16	30.47	26	29.90	20	0.57	70.1	+ 1.1	88.0	30	80.7	49.0	22	61.9	39.0	32.7	29	10.7	9	72.7	60.1	0.93	— 1.41	5,148	ne.	26	ne.	25	5	1	15	14
Florida Peninsula.										73.2	+ 0.6														0.62	— 1.50								
Titusville	12	30.16	.....	30.17	30.43	26	29.94	20	0.49	71.6	.....	86.8	11	79.0	56.0	24	62.6	30.8	28.0	23	5.0	9	77.4	63.6	2.59	.....	7,922	se.	37	n.	19	5	1	13	16
Cedar Keys	22	30.15	+ .12	30.17	30.42	26	29.98	20	0.44	70.6	+ 1.6	81.2	5	76.9	55.0	22	64.7	26.2	19.2	27	4.2	6	74.0	61.1	0.09	— 2.82	6,146	w.	26	e.	10	2	1	17	12
Key West	22	30.12	+ .10	30.14	30.31	6	30.02	20	0.29	75.7	— 0.3	82.5	4	79.7	64.5	26	70.8	18.0	14.0	5	5.4	21	74.4	66.7	1.15	— 0.19	6,938	e.	38	ne.	26	8	5	13	12
Jupiter	28	30.12	.....	30.14	30.37	5	29.93	20	0.44	72.9	.....	88.5	20	80.0	58.8	16	66.0	29.7	23.4	20	6.1	26	79.7	66.0	4.08	.....	7,212	se.	36	ne.	25	7	4	12	14
Eastern Gulf States.										68.2	+ 2.4														1.96	— 3.66								
Atlanta	1,129	28.99	+ .14	30.17	30.57	26	29.88	2	0.69	64.1	+ 3.1	84.3	18	74.3	39.7	21	54.1	44.6	27.2	13	10.0	10	52.7	44.3	1.34	— 3.12	6,868	w.	28	w.	11	5	2	13	15
Pensacola	56	30.10	+ .09	30.16	30.38	26	29.98	2	0.40	69.9	+ 2.9	78.5	5	75.0	54.0	21	61.8	24.5	21.5	15	5.2	1	74.7	61.0	1.60	— 3.18	6,016	sw.	30	.....	11	5	5	12	13
Mobile	35	30.12	+ .12	30.16	30.39	26	29.94	2	0.45	68.0	+ 1.0	84.0	16	76.7	50.0	21	60.9	34.0	25.0	14	7.6	1	80.5	61.0	3.39	— 2.33	6,078	s.	24	se.	23	5	6	16	8
Montgomery	217	29.92	+ .12	30.15	30.49	26	29.88	2	0.61	68.7	+ 3.7	86.6	17	79.3	44.0	21	57.9	42.6	33.9	22	11.6	7	56.2	50.2	1.08	— 4.92	3,779	sw.	24	e.	17	4	5	15	10
Vicksburg	222	29.89	+ .11	30.12	30.31	12	29.84	2	0.47	68.7	+ 2.7	85.0	3	79.2	45.8	21	58.7	39.2	30.0	22	9.8	23	66.1	55.6	2.44	— 4.41	4,922	s.	30	n.	6	5	2	18	10
University	.....	.....	.....	.....	.....	.....	.....	.....	.....	66.4	.....	85.0	16	77.8	42.0	13	55.1	43.0	34.0	22	13.0	2	.....	.....	1.69	.....	.....	s.	.....	.....	.....	8	.....	.....	.....
New Orleans	52	30.08	+ .12	30.14	30.33	26	29.96	2	0.37	69.9	+ 0.9	85.0	5	78.4	56.3	13	63.3	26.7	22.0	22	6.8	12	77.3	61.8	1.89	— 3.99	5,201	e.	26	n.	23	8	1	21	8
Auburn	.....	.....	.....	.....	.....	.....	.....	.....	.....	66.7	.....	83.0	16	75.4	48.0	24	58.0	35.0	24.0	16	8.0	9	.....	.....	2.47	.....	.....	sw.	.....	.....	27	9	.....	.....	.....
Western Gulf States.										68.9	+ 2.4														5.01	+ 0.79								
Shreveport	249	29.83	+ .09	30.08	30.34	13	29.78	2	0.56	69.3	+ 2.3	87.0	2	78.7	46.0	30	59.9	41.0	28.3	14	11.6	11	69.4	57.6	4.49	— 1.18	5,115	s.	27	s.	27	9	9	13	8
Fort Smith	470	29.60	+ .15	30.10	30.39	12	29.72	9	0.67	65.0	+ 4.0	89.7	1	76.3	41.5	30	55.4	48.2	35.2	1	9.5	27	60.1	49.2	7.24	+ 2.36	4,311	se.	24	sw.	9	10	9	5	16
Little Rock	309	29.79	+ .13	30.12	30.40	13	29.78	9	0.62	66.2	+ 3.2	86.0	5	76.8	43.0	21	55.0	43.0	33.0	22	13.5	29	59.7	50.5	0.84	— 4.28	4,990	se.	27	s.	6	6	9	9	12
Corpus Christi	20	30.05	+ .15	30.06	30.31	13	29.84	9	0.47	72.6	+ 2.6	79.3	24	76.0	57.3	30	67.4	22.0	16.0	28	2.9	18	83.7	67.4	1.45	.....	10,898	se.	48	e.	20	4	10	18	2
Galveston	44	30.06	+ .11	30.10	30.30	13	29.91	9	0.39	71.2	+ 1.2	78.0	23	75.3	55.5	30	67.7	22.5	15.3	30	5.2	28	85.5	66.6	3.13	+ 0.09	9,109	s.	36	s.	27	9	6	18	6
Palestine	533	29.53	+ .09	30.08	30.31	13	29.85	2	0.46	68.5	+ 2.5	84.4	4	77.7	41.0	30	61.3	34.5	23.4	17	4.4	26	74.9	59.1	6.62	+ 2.81	7,190	s.	32	se.	8	8	9	15	6
San Antonio	781	29.20	+ .11	30.08	30.37	12	29.80	8	0.51	69.3	+ 1.3	86.0	4	78.5	50.2	30	62.7	35.8	26.4	14	7.6	27	77.9	61.3	7.72	+ 4.92	6,434	se.	34	n.	24	13	14	12	4
Rio Grande Valley.										74.4	+ 1.4														4.14	+ 3.42								
Rio Grande City	230	29.84	+ .10	30.09	30.39	12	29.87	9	0.52	74.5	+ 2.5	92.4	9	83.7	58.8	30	67.6	33.6	26.6	2	7.9	28	81.0	67.6	3.50	+ 2.60	6,314	se.	26	n.	29	7	9	12	9
Brownsville	57	29.99	+ .11	30.05	30.29	13	29.84	9	0.45	74.2	+ 0.2	84.1	24	81.1	60.9	14	68.4	23.2	19.3	29	5.2	20	85.2	69.4	4.72	+ 4.23	7,264	s.	37	ne.	29	9	4	25	1
Ohio Val. & Tenn.										67.9	+ 1.6														2.72	— 1.51								
Chattanooga	783	29.33	+ .13	30.15	30.58	26	29.82	2	0.76	63.0	+ 3.6	83.7	29	75.5	40.0	21	52.3	43.7	34.2	15	7.2	9	59.8	47.4	4.43	— 0.49	5,096	s.	26	sw.	10	7	4	8	18
Knoxville	980	29.13	+ .14	30.16	30.58	26	29.82	2	0.76	61.3	+ 3.3	84.8	29	73.4	35.5	21	49.5	49.3	30.0	15	13.0	9	59.1	45.5	4.00	— 1.44	4,885	n.	36	w.	5	9	4	7	19
Memphis	320	29.79	+ .13	30.13	30.40	12	29.78	1	0.62	65.5	+ 0.5	86.5	4	75.8	43.0	21	55.8	43.5	32.5	17	7.5	23	54.1	47.3	1.15	— 4.80	5,309	no.	32	sw.	6	6	5	12	13
Nashville	549	29.55	+ .14	30.13	30.46	26	29.73	1	0.73	61.9	+ 2.9	85.0	17	73.9	38.0	21	50.9	47.0	38.0	15	10.1	9	51.3	41.8	4.18	— 0.99	4,804	nw.	35	nw.	17	7	3	10	17
Louisville	551	29.56	+ .15	30.15	30.48	25	29.61	1	0.87	59.6	+ 3.6	84.8	26	69.7	32.5	21	48.0	52.3	33.6	17	11.0	10	52.2	40.2	2.99	— 1.70	6,010	ne.	35	nw.	5	7	4	8	18
Indianapolis	766	29.33	+ .17	30.15	30.50	25	29.55	1	0.95	52.6	+ 0.6	83.3	28	64.0	30.9	3	42.0	52.4	34.9	17	7.7	22	54.2	34.7	4.05	+ 0.49	4,758	nw.	24	nw.	6	9	6	13	11
Terre Haute	.....	.....	.....	.....	.....	.....	.....	.....	.....	55.0	.....	82.2	29	67.1	32.4	31	42.8	49.8	35.8	15	8.1	30	.....	.....	3.93	.....	.....	w.	.....	.....	.....	6	.....	.....	.....
Cincinnati	628	29.47	+ .16	30.15	30.52	25	29.57	1	0.95	54.7	+ 0.7	84.1	29	65.5	33.4	20	44.1	50.7	32.4	17	8.0	22	51.9	35.7	1.14	— 1.27	5,922	n.	30	sw.	1	5	4	10	16
Columbus	812	29.29	+ .17	30.16	30.58	25	29.56	1	1.02	51.0	— 0.0	84.3	29	62.1	30.4	8	40.2	53.9	34.4	1	10.4	15	54.1	33.0	1.53	— 1.75	5,989	w.	42	sw.	30	11	5	8	17
Pittsburg	847	29.22	+ .14	30.12	30.57	25	29.55	1	1.02	50.5	— 0.5	86.0	29	61.6	25.5	8	38.9	60.5	38.1	1	8.5	20	61.1	36.0	1.04	— 1.60	5,254	nw.	36	w.	14	14	10	11	9
Lexington	.....	29.10	.....	.....	.....	.....	.....	.....	.....	55.6	.....	84.0	28	67.5	32.4	21	43.8	51.6	39.0	17	11.5	10	52.9	36.9	3.17	.....	.....	ne.	30	sw.	10	6	5	9	16
Lower lake region.										42.2	— 1.7														1.94	— 0.41								
Buffalo	690	29.38	+ .16	30.12	30.59	25	29.58	1	1.01	38.8	— 2.2	66.0	27	46.1	21.4	8	32.0	44.6	32.6	9	4.5	11	70.4	29.0	3.46	+ 1.15	7,212	sw.	45	sw.	11	13	5	12	13
Oswego	335	29.73	+ .12	30.10	30.54	25	29.51	2	1.03	38.1	— 1.9	72.0	27	44.0	19.2	8	32.1	52.8	31.7	27	5.0	15	72.4	29.2	2.09	+ 0.03	7,870	w.	36	w.	18	13	8	11	11
Rochester	621	29.44	+ .14	30.12	30.58	25	29.60	2	0.98	40.5	— 1.5	79.5	28	49.0	21.0	8	32.9	58.5	31.0	27	7.8	24	67.3	29.1	1.22	— 1.41	8,739	nw.	42	w.	18	11	6	13	11
Erie	681	29.40	+ .16	30.14	30.58	25	29.52	1	1.06	41.8	— 2.2	73.0	29	50.4	22.5	8	34.7	50.5	29.4	5	6.4	20	66.7	30.4	2.70	+ 0.16	7,007	nw.	44	sw.	5	12	8	10	12
Cleveland	690	29.40	+ .16	30.15	30.59	25	29.54	1	1.05	44.5	— 0.5	79.0	29	54.0	26.5	8	36.2	52.5	37.3	1	5.6	20	65.5	32.6	2.18	— 0.19	6,196	nw.	39	s.	5	11	11	7	12
Sandusky	629	29.42	+ .11	30.16	30.58	25	29.57	1	1.01	45.4	— 0.6	85.1	26	55.0	28.5	8	37.7	56.6	37.0	5	6.9	5	62.0	31.9	1.61	— 0.84	7,298	e.	42	nw.	4	7	9	7	14
Toledo	673	29.42	+ .14	30.16	30.59	25	29.57	1	0.99	45.6	— 1.4	83.0	29	55.1	25.8	8	36.7	57.2	36.5	29	6.9	19	60.2	31.0	0.86	— 1.36	7,654	nw.	36	w.	10	9	10	11	9
Detroit	662	29.43	+ .16	30.16	30.57	25	29.58	1	0.99	42.0	— 3.1	82.0	28	51.8	23.2	8	34.7	58.8	41.5	29	3.0	15	63.3	29.9	1.44	— 0.84	7,179	nw.	36	s.	13	9	11	9	10
Upper lake region.										36.8	— 1.5														2.49	+ 0.14								
Alpena	609	29.46	+ .14	30.15	30.47	24	29.44	10	1.03	34.5	— 1.5	70.6	27	41.9	13.2	8	27.6	57.4	30.3	27	4.0	30	80.0	28.4	2.82	+ 0.80	7,270	nw.	36	e.	10	9	6	15	9
Escanaba	608	.....	.....	.....	.....	.....	.....	.....	.....	35.2	— 0.8	61.0	27	45.3	10.0	3	25.1	51.0	34.4	4	5.5	29	.....	.....	2.80	+ 0.80	.....	n.	.....	w.	.....	14	.....	.....	.....
Grand Haven	620	29.45	+ .15	30.13	30.49	24	29.51	10	0.98	41.5	— 2.5	74.0	28	49.9	37.6	24	34.4	36.4	33.5	29	4.7	20	67.7	30.6	1.54	— 1.00	8,820	nw.	36	s.	13	12	11	7	12
Lansing	883	29.18	.....	30.14	30.50	25	29.53	10	0.97	43.0	— 2.0	82.3	28	53.8	22.0	3	33.0	60.3	40.2	29	7.9	30	69.2	32.3	1.45	.....	6,228	nw.	30	sw.	10	8	9	9	12
Marquette	672	29.40	+ .14	30.16	30.56	24	29.61	5	0.95	33.2	— 3.8	61.8	27	40.6	13.5	8	26.5	48.3	33.3	8	4.0	19	76.9	26.5	5.07	+ 3.22	6,488	nw.	36	nw.	5	15	8	16	6
Port Huron	639	29.45	+ .17	30.16	30.59	25	29.51	10	1.08	40.0	— 1.0	81.9	28	48.9	20.3	8	31.6	61.6	34.9	26	3.0	24	68.5	29.4	1.25	— 0.83	8,629	n.	48	w.	6	8	5	14	11
Chicago	715	29.37	+ .16	30.

Table of miscellaneous meteorological data for April, 1888—Signal Service observations—Continued.

Stations and districts.	Elevation above sea-level, feet.	Atmospheric pressure, in inches and hundredths.								Temperature of the air, in degrees Fahrenheit.												Mean relative humidity, per cent.	Mean temperature of dew-point, Fahrenheit.	Precipitation, in inches.		Winds.					
		Mean actual barometer.	Departure from normal.	Mean reduced barometer.	Extremes.				Monthly range of barometer.	Monthly mean.	Departure from normal.	Extremes.						Monthly range.	Daily ranges.							Total movement, miles.	Prevailing direction.	Maximum velocity.			No. of rainy days.	No. of cloudy days.	No. of fair days.	No. of clear days.
					Highest barometer.	Date.	Lowest barometer.	Date.				Max.	Date.	Mean max.	Min.	Date.	Mean min.		Greatest.	Date.	Least.	Date.							Miles p. h.	Direction.	Date.				
Upper Miss. Valley.										51.1	— 0.4													2.47	— 0.52							
Saint Paul	831	29.20	+ .15	30.12	30.57	12	29.49	4	1.08	40.5	— 5.5	76.0	26	50.6	22.6	6	32.6	53.4	27.0	26	6.0	29	76.7	33.1	5.14	+ 2.83	5,710	e.	40	e.	4	11	9	15	6
La Crosse	744	29.34	+ .18	30.15	30.61	12	29.63	5	0.98	44.1	— 3.9	74.2	27	53.0	26.0	6	35.7	48.2	31.0	28	7.2	29	61.8	30.2	3.29	+ 1.29	6,714	nw.	28	nw.	17	13	11	15	4
Davenport	615	29.45	+ .14	30.12	30.57	12	29.60	1	0.97	49.5	— 0.5	81.3	26	60.8	29.2	12	39.1	52.1	34.4	13	7.1	30	60.5	34.7	1.57	— 1.27	6,867	nw.	48	sw.	13	6	3	15	12
Des Moines	866	29.18	+ .24	30.11	30.62	12	29.58	4	1.04	51.0	+ 1.0	79.6	26	62.4	21.4	20	40.0	58.2	35.9	6	6.3	30	63.6	37.3	1.45	— 1.47	5,967	n.	30	nw.	17	9	7	11	12
Dubuque	665	29.41	+ .16	30.14	30.60	12	29.62	5	0.98	47.9	— 0.1	81.6	26	58.2	28.5	6	37.9	53.1	31.0	13	5.7	30	65.9	35.6	2.58	— 0.22	4,921	nw.	25	sw.	13	12	7	12	11
Keokuk	618	29.43	+ .14	30.09	30.56	12	29.58	1	0.98	53.2	+ 1.2	81.0	26	64.7	29.3	20	42.5	51.7	34.6	1	7.0	9	59.2	37.6	1.85	— 1.09	7,450	se.	34	sw.	15	6	2	12	16
Cairo	359	29.76	+ .16	30.14	30.45	12	29.66	1	0.79	61.4	+ 2.4	82.5	17	71.3	40.0	20	52.5	42.5	38.1	3	9.7	6	51.7	41.8	3.68	— 1.06	7,671	n.	36	nw.	22	7	5	12	13
Springfield	644	29.46	+ .16	30.15	30.55	12	29.60	1	0.95	53.4	— 0.6	80.0	27	65.7	30.0	13	41.5	50.0	38.8	13	13.7	29	56.2	36.4	1.41	— 2.11	6,721	s.	36	w.	17	6	6	13	11
Saint Louis	571	29.51	+ .14	30.12	30.52	12	29.56	1	0.96	58.6	+ 2.7	87.5	1	70.5	34.8	20	48.4	52.7	33.4	17	12.2	29	53.0	39.5	1.88	— 1.69	9,370	se.	44	s.	5	4	4	8	18
Missouri Valley.										51.0	+ 2.5													1.83	— 1.15							
Lamar	1,028	29.05	.....	30.14	30.60	12	29.68	9	0.92	58.7	.....	82.8	22	70.3	30.8	20	48.5	52.0	33.2	3	10.4	8	64.2	45.1	3.27	— 1.13	8,356	se.	37	nw.	5	7	5	14	11
Springfield	1,356	28.68	.....	30.10	30.45	12	29.64	1	0.81	55.6	— 0.4	84.3	1	70.8	30.8	20	48.9	53.5	35.6	21	8.5	27	57.3	42.3	1.82	.....	8,640	se.	36	s.	4	7	4	12	14
Leavenworth	842	29.22	+ .15	30.11	30.62	12	29.60	9	1.02	56.5	+ 2.5	87.4	22	68.8	29.5	20	45.8	57.9	41.6	21	9.4	8	59.5	40.9	2.32	— 1.28	6,067	s.	30	se.	4	8	6	15	9
Topeka	.....	.....	.....	.....	.....	.....	.....	.....	.....	55.7	.....	90.1	22	70.3	27.0	20	43.1	63.1	43.9	21	10.0	8	65.0	42.1	1.36	.....	.....	.....	.....	.....	..	7	4	14	12
Omaha	1,113	28.93	+ .15	30.13	30.65	12	29.52	4	1.13	52.5	+ 2.5	86.5	21	65.5	28.0	20	42.1	58.5	41.7	21	8.0	9	58.4	36.1	2.95	— 0.34	7,465	n.	36	n.	18	8	9	13	8
Crete	.....	.....	.....	.....	.....	.....	.....	.....	.....	53.5	.....	87.3	21	68.2	26.0	20	40.7	61.3	43.3	21	7.5	29	67.2	41.4	2.31	.....	.....	.....	.....	.....	..	5	8	11	11
Valentine	2,614	27.33	.....	30.06	30.58	11	29.31	4	1.27	50.0	+ 5.0	88.0	21	66.0	23.2	30	36.1	64.8	48.2	21	11.8	25	54.9	30.9	1.05	— 0.91	9,692	n.	56	s.	24	6	4	12	14
Fort Sully	1,600	28.34	+ .08	30.06	30.62	28	29.30	4	1.32	49.7	+ 4.7	83.0	21	63.0	22.5	19	36.2	60.5	44.3	8	11.9	1	56.2	32.7	0.53	— 1.23	8,007	se.	47	nw.	16	8	3	15	12
Huron	1,307	28.68	+ .12	30.10	30.59	11	29.41	4	1.18	44.8	+ 0.8	79.8	21	60.2	30.0	19	31.4	59.8	47.0	20	11.0	28	62.2	30.7	0.88	— 2.01	9,156	se.	54	sw.	8	5	5	8	12
Yankton	1,334	28.76	+ .12	30.08	30.60	11	29.40	4	1.20	48.2	— 2.2	84.8	21	63.0	24.2	19	37.0	60.6	42.0	21	5.2	29	65.3	35.1	2.16	— 1.17	7,621	n.	48	s.	17	9	6	13	11
Northern slope.										46.6	— 4.1													1.06	— 0.22							
Fort Assinaboine	2,720	27.17	+ .05	30.01	30.78	28	29.45	4	1.33	44.6	+ 2.6	80.0	20	58.8	15.1	5	32.9	64.9	40.0	19	12.5	10	57.2	28.7	0.50	— 0.56	7,680	nw.	49	w.	8	7	11	15	4
Fort Custer	3,040	26.86	+ .07	30.01	30.73	28	29.39	4	1.34	50.5	+ 5.7	81.3	24	64.5	25.4	1	34.7	55.9	45.8	12	14.8	28	50.5	29.0	0.63	— 0.68	5,748	n.	38	w.	1	6	6	14	10
Fort Maginnis	4,340	25.57	+ .06	30.00	30.72	28	29.46	4	1.20	43.2	+ 4.2	74.7	23	58.3	17.4	11	32.7	57.3	40.6	11	10.6	3	65.2	31.3	1.57	+ 0.50	8,398	nw.	48	nw.	26	7	6	16	8
Helena	4,069	25.84	— .04	29.99	30.65	28	29.51	4	1.14	48.8	+ 6.8	78.0	20	60.4	27.5	17	38.2	50.5	32.5	12	10.0	2	44.2	24.9	0.56	— 0.93	5,941	sw.	30	sw.	1	6	13	15	2
Poplar River	2,030	27.89	+ .08	30.03	30.82	28	29.42	25	1.40	38.6	— 2.4	84.3	24	52.8	— 4.5	2	26.5	88.8	46.8	24	9.0	28	70.9	26.8	0.78	+ 0.08	6,615	n.	40	nw.	17	7	3	17	10
Cheyenne	6,105	24.04	+ .11	30.03	30.58	28	29.42	25	1.16	47.8	+ 7.8	76.3	21	61.2	24.6	28	34.4	51.7	40.5	20	8.2	28	37.0	14.2	0.94	— 0.35	8,627	nw.	48	nw.	4	4	4	12	14
Laramie	.....	.....	.....	.....	.....	.....	.....	.....	.....	51.6	.....	84.5	21	69.3	22.0	3	33.9	59.9	53.0	20	8.8	28	.....	.....	0.30	.....	.....	nw.	..	2	..	..	..
North Platte	2,841	27.12	+ .11	30.06	30.56	11	29.45	4	1.11	52.1	+ 4.1	88.9	21	67.9	26.2	28	37.0	62.7	48.0	21	9.2	27	55.0	32.0	2.36	+ 0.40	8,526	se.	48	n.	16	6	3	17	10
Rapid City	.....	26.64	.....	.....	.....	.....	.....	.....	.....	49.6	.....	84.0	21	64.0	20.0	11	34.6	64.0	44.4	12	14.0	28	58.7	33.2	0.41	.....	7,732	nw.	46	sw.	24	6	6	12	12
Fort Washakie	.....	24.47	.....	.....	.....	.....	.....	.....	.....	48.8	.....	76.0	21	63.1	26.4	29	34.6	49.6	38.8	12	13.7	1	52.7	30.4	0.64	.....	4,674	sw.	42	sw.	30	3	3	10	17
Fort McKinney	.....	25.00	.....	.....	.....	.....	.....	.....	.....	48.0	.....	77.0	21	25.2	23.0	28	37.2	54.0	34.0	16	4.0	17	56.0	31.2	0.73	.....	7,565	w.	48	.....	28	6	5	12	12
Fort Robinson	.....	.....	.....	.....	.....	.....	.....	.....	.....	51.1	.....	85.0	21	69.3	20.1	28	32.9	64.9	48.9	13	19.9	9	.....	.....	0.84	.....	.....	e.	.....	.....	..	6	..	..	..
Middle slope.										50.3	+ 4.5													2.69	+ 0.41							
Colorado Springs	.....	.....	.....	.....	.....	.....	.....	.....	.....	51.5	.....	80.0	21	65.8	27.0	29	36.9	53.0	42.7	20	7.4	28	44.9	35.6	1.51	.....	.....	.....	.....	.....	..	4	5	16	9
Denver	5,281	24.79	+ .13	29.99	30.58	28	29.38	25	1.20	53.2	+ 6.2	80.6	21	67.0	30.0	28	39.5	50.6	39.8	12	7.1	27	41.3	24.4	1.71	— 0.40	5,714	s.	40	sw.	7	5	4	12	14
Pike's Peak	14,134	17.81	.....	30.05	30.53	28	29.56	25	0.97	20.8	.....	38.0	21	28.3	1.8	28	15.4	36.2	22.5	12	6.4	27	74.6	13.1	2.09	— 1.66	13,756	w.	75	w.	1	12	1	17	12
Las Animas	3,899	26.06	+ .11	29.97	30.52	12	29.48	25	1.04	56.7	+ 6.7	87.5	22	72.6	31.0	29	41.5	56.5	50.0	22	11.0	28	44.5	29.4	2.59	+ 1.16	6,586	e.	48	n.	9	5	6	10	14
Concordia	1,384	28.61	.....	30.07	30.62	12	29.48	4	1.14	55.7	+ 5.7	92.0	21	69.7	28.3	12	43.1	64.3	47.3	21	7.3	29	56.3	38.2	0.65	— 2.02	8,237	se.	54	s.	4	6	8	12	10
Dodge City	2,524	27.45	+ .14	30.08	30.66	12	29.55	4	1.11	56.9	+ 3.9	89.8	22	71.7	31.0	29	43.4	58.8	49.7	8	9.2	8	69.0	45.1	4.08	+ 2.69	10,357	s.	66	se.	26	10	6	9	15
Fort Reno	.....	.....	.....	.....	.....	.....	.....	.....	.....	62.6	.....	95.0	1	76.1	34.3	30	49.1	60.7	.....	.....	.....	.....	.....	.....	2.41	— 0.07	.....	s.	.....	.....	..	7	..	..	..
Fort Supply	.....	.....	.....	.....	.....	.....	.....	.....	.....	61.6	.....	88.2	24	76.6	37.1	29	46.7	51.1	40.6	1	12.2	29	.....	.....	4.73	+ 0.96	.....	se.	.....	.....	..	9	..	..	..
Fort Elliott	2,650	27.30	+ .13	30.00	30.48	12	29.66	9	0.82	59.0	0.0	88.0	1	72.0	37.4	30	47.0	50.6	37.2	14	7.0	8	63.5	44.2	2.69	+ 0.55	10,825	se.	48	n.	17	8	8	12	10
Southern slope.										63.2	+ 1.9													2.92	+ 1.56							
Fort Sill	1,200	28.82	+ .12	30.07	30.46	12	29.67	9	0.79	62.7	+ 1.7	92.2	1	74.4	36.5	3	51.2	55.7	45.7	1	10.0	27	72.6	52.5	3.63	+ 1.30	9,154	s.	48	s.	26	10	7	8	15
Abilene	1,748	28.24	.....	30.05	30.45	12	29.66	8	0.79	65.4	+ 2.4	92.0	3	75.6	41.5	30	55.8	50.5	34.6	3	7.3	28	76.9	56.4	5.16	+ 3.10	8,664	sw.	60	se.	27	8	8	15	7
Fort Davis	4,928	25.21	+ .06	29.99	30.41	12	29.64	26	0.77	61.5	+ 1.5	84.0	4	74.1	36.0	13	50.0	48.0	35.8	1	10.0	19	49.5	36.7	1.21	— 0.71	5,109	sw.	36	sw.	26	11	4	11	15
Fort Stanton	6,154	23.99	.....	29.89	30.21	12	29.53	26	0.68	52.8	.....	73.5	15	65.6	31.0	29	39.1	42.5	37.8	3	4.8	20	41.3	25.8	1.69	+ 1.10	4,958	w.	30	sw.	17	8	4	13	13
Southern plateau.										61.8	+ 5.4													0.38	— 0.04							
El Paso	3,764	26.23	+ .04	29.96	30.31	12	29.63	26	0.68	66.9	+ 3.9	86.8	16	80.4	44.0	28	52.2	42.8	38.0	3	17.0	19	41.6	40.1	0.74	+ 0.57	4,253	w.	36	n.	26	1	1	5	24
Lava	.....	.....	.....	.....	.....	.....	.....	.....	.....	59.0	.....	85.0	15	74.9	37.9	28	43.2	47.1	41.9	2	13.4	27	.....	.....	0.45	+ 0.28	.....	sw.	.....	.....	..	7	..	..	..
Santa Fé	7,026	23.31	+ .11	30.02	30.43	12	29.73	25	0.70	49.9	+ 4.9	72.5	15	61.9	29.0	28	39.3	43.5	30.2	13	12.0	26	47.4	27.1	1.42	+ 0.73	4,428	e.	26	e.	17	10	10	12	8
Fort Apache	5,020	.....	.....	.....	.....	.....	.....	.....	.....	54.4	.....	83.0	14	74.9	30.0	3	38.2	53.0	46.5	3	24.7	8	.....	.....	0.71	— 0.08	.....	ne.	.....	.....	..	7	..	..	..
Fort Bowie	.....	.....	.....	.....	.....	.....	.....	.....	.....	62.4	.....	80.5	17	73.3	40.5	27	51.4	40.0	.....	.....	.....	.....	.....	.....	T.	— 0.08	.....	sw.	.....	.....	..	..	..	..	..
Fort Grant	4,910	25.21	.....	29.98	30.19	12	29.76	26	0.43	61.5	.....	82.4	15	73.0	40.8	27	50.8	41.6	30.4	15	12.0	18	30.6	28.8	0.50	.....	5,024	n.	40	se.	13	1	3	10	17
Fort McDowell	.....	.....	.....	.....	.....	.....	.....	.....	.....	71.2	.....	99.0	30	90.4	41.0	1	51.9	58.0	47.0	3	21.0	25	.....	.....	0.14	— 0.18	.....	w.	.....	.....	..	3	..	..	..
Fort Thomas	2,710	.....	.....	.....	.....	.....	.....	.....	.....	66.2	.....	91.1	30	83.7	38.4	10	49.3	52.7	44.0	30	27.7	12	.....	.....	0.37	+ 0.11	.....	s.	.....	.....	..	5	..	..	..
Fort Verde	.....	.....	.....	.....	.....	.....	.....	.....	.....	63.4	.....	90.3	14	81.6	35.0	27	45.2	55.3	45.3	14	22.2	20	.....	.....	0.43	— 0.27	.....	sw.	.....	.....	..	5	..	..	..
Phœnix	.....	.....	.....	.....	.....	.....	.....	.....	.....	70.9	.....	95.0	13	85.8	47.0	1	56.0	48.0	38.0	11	21.0	3	.....	.....	0.01	.....	.....	.....	.....	.....	..	2	..	..	..
Prescott	5,389	24.75	+ .08	29.99	30.24	6	29.74	25	0.50	55.3	+ 6.3	78.5	14	70.1	31.3	26	39.6	47.2	38.5	29	17.5	4	57.4	38.2	0.52	— 0.55	5,020	sw.	40	sw.	24	6	2	18	10
San Carlos	.....	.....	.....	.....	.....	.....	.....	.....	.....	60.6	.....	92.0	16	83.7	36.0	1	48.7	56.0	44.5	1	15.5	26	.....	.....	0.0	— 0.21	.....	s.	.....	.....	..	0	..	..	..
Willcox	.....	.....	.....	.....	.....	.....	.....	.....	.....	61.6	.....	88.8	16	81.0	32.0	28	42.3	56.8	49.0	2	24.1	21	.....	.....	0.03	+ 0.01	.....	w.	.....	.....	..	2	..	..	..
Yuma	141	29.76	.00	29.93	30.11	6	29.68	16	0.43	75.3	+ 6.3	101.7	12	90.4	47.0	1	57.7	54.7	40.3	11	19.6	7	37.0	43.4	T.	— 0.11	4,660	w.	40	w.	25	0	0	5	25
Keeler	3,622	26.32	.....	29.92	30.14	12	29.57	30	0.57	63.4	.....	85.8	13	75.1	39.0	25	51.3	46.8	30.1	13	15.2	24	33.5	32.3	0.12	— 0.67	4,501	s.	42	nw.	16	2	0	15	15
Middle plateau.										65.0	+ 7.6													0.59	— 1.13							
Fort Bidwell	4,615	25.43	.....	30.08	30.37	11	29.75	3	0.62	51.6	.....	81.2	20	66.1	24.2	9	36.7	57.0	37.8	9	13.9	4	61.6	36.9	0.16	.....	4,606	w.	36	sw.	2	3	2	12	16
Winnemucca	4,344	25.68	+ .11	30.05	30.35	28	29.60	30	0.75	54.6	+ 7.6	83.2	20	68.1	21.0	5	35.2	62.2	49.0	18	15.2	25	25.9	13.6	0.20	— 0.96	6,806	w.	38	w.	30	3	1	12	17
Brock's Ranch	.....	.....	.....	.....	.....	.....	.....	.....	.....	54.6	.....	88.3	20	72.9	27.2	3	36.2	61.1	48.4	20	17.7	25	.....	.....	0.25	.....	.....	w.	.....	.....	..	11	..	..	..
Salt Lake City	4,348	25.65	+ .08	30.00	30.36	12	29.49	25	0.87	55.5	+ 7.5	80.1	22	66.7	31.1	5	42.9	49.0	32.5	15	11.6	16	43.2	30.2	0.99	— 1.63	4,150	nw.	30	s.	24	5	2	11	17
Montrose	5,780	24.31	.....	29.95	30.35	12	29.54	25	0.81	53.0	.....	76.0	21	66.4	28.8	29	38.5	47.2	37.5	13	9.7	8	46.8	30.7	0.42	— 1.65	5,049	se.	40	s.	25	8	8	9	13
Fort Bridger	6,643	23.55	.....	30.05	30.43	12	29.46	25	0.97	44.3	.....	72.1	21	57.7	26.0	29	32.6	46.1	40.2	18	10.2	4	54.7	27.9	0.75	— 0.28	4,869	w.	42	sw.	30	6	6	17	7
Carson City	.....	.....	.....	.....	.....	.....	.....	.....	.....	53.8	.....	82.4	21	68.0	20.7	5	36.0	61.7	42.3	20	12.1	24	38.4	25.3	0.18	.....	.....	.....	.....	.....	..	1	0	5	25
Northern plateau.										55.4	+ 6.0													0.40	— 1.48							
Boisé City	2,750	27.20	+ .07	30.03	30.41	28	29.58	3	0.83	56.5	+ 7.5	88.1	25	71.2	25.0	5	40.0	63.1	39.7	15	16.3	1	46.0	33.9	0.12	— 2.12	3,328	w.	40	e.	15	3	4	16	10
Ashland	.....	.....	.....	.....	.....	.....	.....	.....	.....	55.6	.....	87.0	19	71.5	28.0	9	39.7	59.0	46.0	11	16.0	30	.....	.....	1.01	— 1.21	.....	n.	.....	.....	..	7	..	..	..
Fort Klamath	.....	.....	.....	.....	.....	.....	.....	.....	.....	45.9	.....	78.0	19	62.4	18.0	9	29.4	60.0	47.0	18	13.0	1	.....	.....	0.41	.....	.....	w.	.....	.....	..	5	..	..	..
Lakeview	.....	.....	.....	.....	.....	.....	.....	.....	.....	50.1	.....	81.5	19	63.3	26.0	26	36.9	55.5	38.5	18	21.0	25	.....	.....	0.02	— 1.58	.....	s.	.....	.....	..	2	..	..	..
Linkville	.....	.....	.....	.....	.....	.....	.....	.....	.....	50.8	.....	80.1	19	65.5	24.3	5	36.0	55.8	38.9	12	18.9	3	.....	.....	0.20	— 1.90	.....	nw.	.....	.....	..	1	..	..	..
Spokane Falls	1,909	28.01	+ .06	30.03	30.45	11	29.58	3	0.87	51.5	+ 4.5	79.9	20	63.6	27.3	17	38.2	52.6	42.1	19	13.0	8	60.3	36.6	0.39	— 1.12	4,386	sw.	30	sw.	4	6	14	15	1
Walla Walla	1,018	28.98	+ .06	30.08	30.42	11	29.67	3	0.75	58.1	+ 6.1	85.0	19	69.3	36.2	10	46.4	48.8	35.1	11	10.3	8	41.5	33.0	0.09	— 0.93	5,165	sw.	45	sw.	4	5	4	22	4
N. Pac. coast region.										51.6	+ 3.8													2.06	— 1.25							
Fort Canby	179	29.92	.....	30.12	30.35	10	29.72	3	0.63	49.1	.....	64.5	18	54.8	39.5	16	44.3	25.0	20.0	11	4.7	26	81.8	43.4	3.53	.....	8,454	s.	54	s.	7	16	10	16	4
Neah Bay	.....	.....	.....	.....	.....	.....	.....	.....	.....	48.2	.....	63.0	30	56.3	31.0	27	40.2	32.0	.....	.....	.....	.....	.....	.....	7.79	.....	.....	sw.	.....	.....	..	20	..	..	..
Olympia	36	30.08	+ .09	30.12	30.37	11	29.68	3	0.69	50.4	+ 2.4	78.8	19	61.1	31.0	16	40.6	47.8	40.6	19	7.5	26	76.4	42.8	1.72	— 2.08	2,727	s.	24	sw.	4	13	12	10	8
Port Angeles	14	30.08	+ .07	30.09	30.34	10	29.58	3	0.76	46.1	+ 2.1	61.3	19	52.7	29.6	9	38.4	31.7	23.5	19	6.0	30	53.3	41.0	1.56	0.00	3,434	s.	30	w.	4	11	13	16	1
Pysht	.....	.....	.....	.....	.....	.....	.....	.....	.....	46.3	.....	62.0	19	52.9	31.0	27	39.8	31.0	21.0	19	5.5	30	.....	.....	4.49	.....	.....	sw.	.....	.....	..	21	..	..	..
Tatoosh Island	86	30.00	.....	30.09	30.35	10	29.61	3	0.74	46.5	.....	59.7	22	51.6	34.0	4	43.3	25.7	14.8	22	3.8	13	89.8	43.5	5.92	.....	9,055	sw.	45	w.	4	23	19	11	0
Astoria	.....	30.08	.....	30.10	30.34	8	29.70	3	0.64	50.6	+ 5.6	66.0	22	58.1	36.0	9	43.4	30.0	23.5	16	6.0	7	81.4	44.8	4.04	— 0.32	3,926	sw.	28	sw.	28	20	18	5	7
Portland	80	30.04	+ .08	30.13	30.36	9	29.77	3	0.59	55.0	+ 4.0	83.5	19	66.5	32.0	9	44.1	51.5	35.7	11	11.5	8	70.1	44.2	2.06	— 1.36	3,751	nw.	22	s.	30	13	15	8	7
Roseburg	523	29.57	+ .05	30.13	30.34	8	29.82	3	0.52	56.0	+ 5.0	83.8	19	69.0	29.0	9	42.0	54.8	43.0	17	11.0	4	65.0	42.8	0.63	— 2.47	2,640	n.	36	sw.	23	7	8	11	11
Mid. Pac. coast reg.

Meteorological record of voluntary observers and Army post surgeons, April, 1888.

The maximum and minimum temperatures at stations marked thus (*) are from readings of other than standard instruments.

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation.
Alabama.	°	°	°	*Inches*
Bermuda	86	47	68.0	1.09
Greensborough	84	46	66.3	2.16
Livingston	84	44	66.0	0.97
Mt. Vernon B'ks	90	44	70.2	1.50
Newmarket	80	42	63.5	5.85
Talledega	83	43	64.9	1.43
Troy	89	50	69.6	3.50
Tuscaloosa	83	39	70.3	2.03
Tuscumbia	86	44	.....	1.89
Union Springs	87	45	69.0	2.38
Valley Head	84	42	61.4	3.35
Arizona.				
Cedar Springs	.....	.....	.....	0.29
Eagle Pass	.....	.....	.....	0.44
Huachuca, Fort	82	41	.....	0.00
McDowell, Fort	99	40	74.4	0.06
Mojave, Fort	103	41	.....	0.00
Tucson	93	40	.....	T.
Arkansas.				
Eureka Springs	86	34	.....	3.64
Hot Springs	.....	40	65.3	1.86
Lead Hill	94	36	65.3	1.98
British Columbia.				
New Westminster	67	34	49.7	3.78
California.				
Alcatraz Island	79	42	54.6	0.25
Angel Island	94	45	59.1	0.04
Banning	91	38	.....	0.80
Benicia Barracks	84	46	60.4	T.
Bidwell, Fort	85	26	.....	0.15
Gaston, Fort	92	27	.....	0.70
Georgetown	83	36	46.2	1.05
Hydesville	70	34	.....	0.83
Lewis Creek*	100	48	74.0	0.16
Mason, Fort	.....	.....	59.9	0.10
Oakland	82	44	57.3	0.10
Oroville	87	45	66.0	0.14
Presidio of San F	84	38	55.3	0.00
Riverside	96	38	69.9	0.15
Sacramento	87	36	59.5	0.10
Salinas	79	42	54.2	0.00
Santa Barbara	95	43	59.9	0.16
Santa Maria	95	40	61.0	0.12
Willows	93	35	64.6	0.11
Colorado.				
Fort Collins	90	30	54.6	1.08
Grand Junction*	92	31	54.9	0.58
Georgetown	64	19	43.7	0.58
Lewis, Fort	71	12	45.6	1.42
Connecticut.				
Hartford	87	19	34.6	2.14
New Hartford	80	20	37.3	2.65
Voluntown	76	25	44.0	.....
Dakota.				
A. Lincoln, Fort	84	7	43.4	2.04
Davenport	76	24	44.4	1.06
Garden City	70	13	40.0	2.85
Meade, Fort	84	22	.....	0.20
Parkston	82	20	47.2	1.84
Pembina, Fort	76	4	.....	0.69
Randall, Fort	87	25	51.4	1.30
Sisseton, Fort	70	2	39.6	0.60
Sully, Fort	89	23	49.9	0.51
Totten, Fort	.....	1	35.9	0.46
Webster	75	7	43.1	2.42
Woonsocket	84	16	45.5	0.86
Yates, Fort	82	18	46.6	0.30
District of Columbia.				
Distribut'g res'v'r*	87	13	54.4	2.27
Kendall Green	85	34	54.0	1.88
Receiving res'v'r*	86	38	53.4	2.09
Aqueduct office*	94	37	56.7	.....
Florida.				
Alva*	86	62	70.4	2.00
Archer	94	42	.....	1.33
Duke	88	58	68.2	0.94
Fort Meade*	88	59	73.0	0.60
Homeland*	89	55	74.6	0.35
Limona*	89	60	75.0	0.34
Manatee	92	50	70.6	0.12
Merritt's Island	89	61	71.8	1.69
St. Francis Bar'cks	86	52	69.7	1.15
Tallahassee	88	52	.....	0.30
Georgia.				
Athens	91	37	63.9	1.40
Columbus	85	46	.....	2.16
Forsyth*	90	50	68.8	0.55
Milledgeville*	84	46	66.5	0.99
Quitman	86	51	70.5	0.55
Idaho.				
Boisé Barracks	88	24	62.0	0.16
Lewiston	88	34	.....	0.17
Sherman, Fort	78	25	47.6	1.70
Illinois.				
Charleston*	84	28	53.2	2.43
Collinsville	87	32	57.4	2.36
Jacksonville	80	31	54.7	1.04
Mount Morris	85	30	58.3	.....
Oswego	83	27	.....	.....
Palestine	81	33	47.5	2.02
Pekin	87	28	54.3	2.05
Riley	81	27	43.7	2.16
Rockford	81	27	45.8	2.54
Sandwich*	86	33	49.9	1.70
South Evanston	84	26	.....	2.34
Sycamore	80	30	44.3	2.05
Windsor	80	20	50.3	2.17
Indiana.				
Butlerville*	87	33	56.5	1.37
Jeffersonville	84	23	58.1	3.32
Laconia	88	29	.....	2.65
La Grange	83	22	46.2	2.20

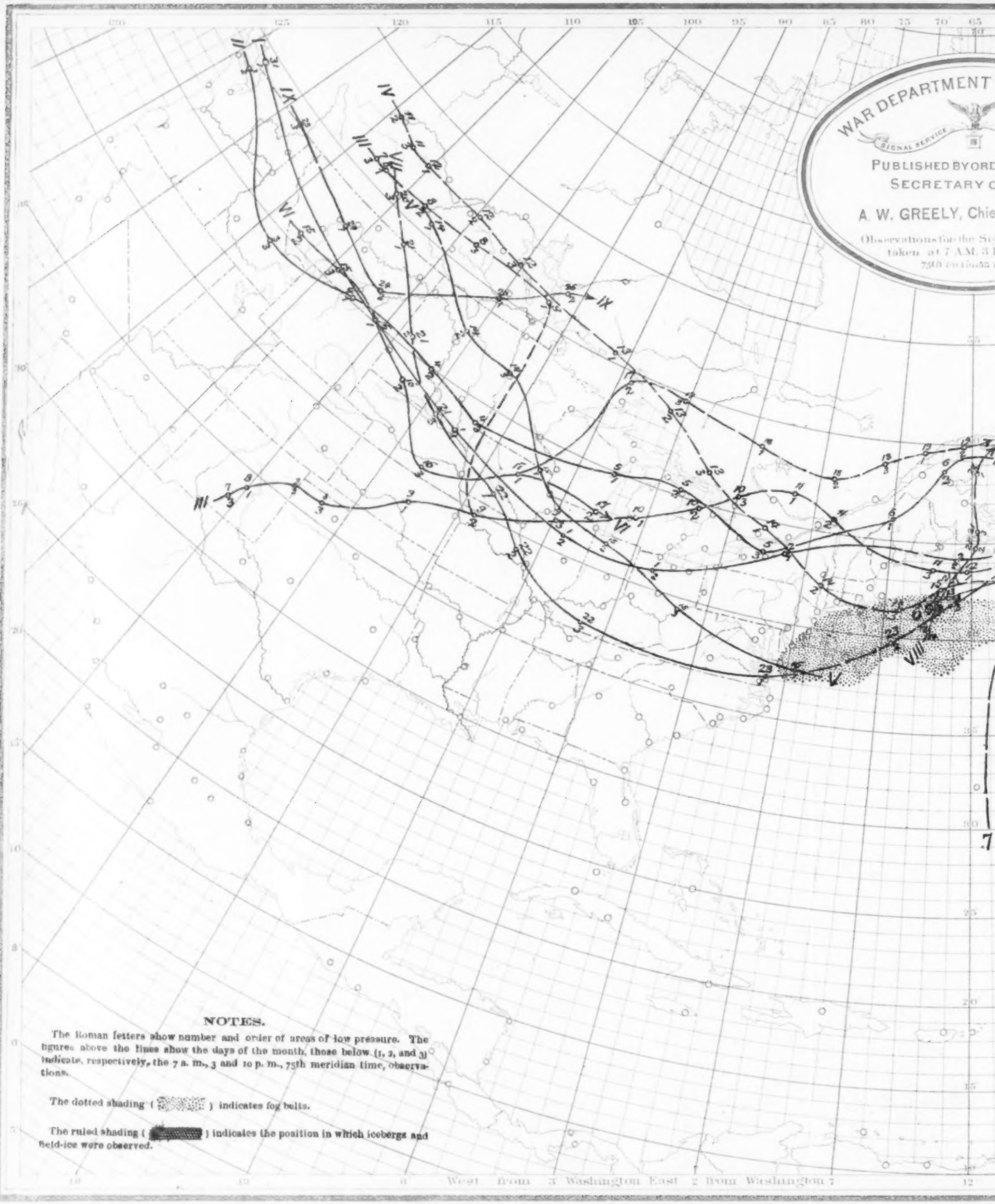
Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation.
Indiana—Con'd.	°	°	°	*Inches*
Logansport*	89	30	52.0	3.33
Mauzy	83	25	48.8	1.80
Sunman*	83	23	53.1	2.01
Vevay	86	28	57.2	1.90
Indian Territory.				
Gibson, Fort	91	29	65.3	1.84
Reno, Fort	85	33	60.9	2.28
Supply, Fort	90	32	.....	4.42
Iowa.				
Albion	.....	.....	.....	1.33
Amana	86	25	49.3	1.40
Ames	72	30	49.1	2.25
Auburn	78	32	56.2	3.27
Bancroft	79	20	44.5	5.48
Cedar Rapids *a*	82	20	48.6	1.74
Clarinda	81	28	53.4	1.50
Clear Lake	70	32	43.7	6.60
Clinton	90	27	48.5	1.48
Cromwell	.....	.....	.....	1.57
Cresco	74	25	42.5	3.68
Denmark	80	40	.....	1.40
Des Moines	78	24	51.7	.....
Dysart	80	25	52.5	1.78
Elkader	79	29	47.5	4.33
Fort Madison	82	33	.....	2.12
Glenwood *a*	86	33	56.3	.....
Glenwood *b*	82	20	55.2	.....
Hampton	75	23	46.2	2.15
Iowa City	72	29	46.4	1.48
Independence*	75	32	46.6	2.53
Manson	76	23	48.0	3.50
Maquoketa	87	41	.....	1.30
Monticello	82	24	47.3	1.50
Mount Vernon*	84	27	51.0	.....
Osage	.....	.....	.....	4.37
Osceola	70	20	48.0	1.51
Oskaloosa *a*	82	19	.....	.....
Oskaloosa *b*	86	25	51.5	1.63
Sac City	78	26	47.1	5.49
Vinton	71	28	47.2	1.71
West Bend	82	24	45.7	7.80
Kansas.				
Allison	.....	.....	.....	3.29
East Norway	80	33	56.0	1.10
Eldorado	88	30	51.0	3.02
Elk Falls	85	34	.....	4.93
Emporia	87	.....	.....	3.43
Globe	87	37	56.1	2.53
Hays, Fort	91	23	55.9	1.51
Independence	87	34	56.1	6.37
Lawrence	88	31	57.6	2.58
Lebo	94	27	56.6	2.75
Manhattan *b*	93	32	56.5	1.28
Morse*	82	25	53.5	2.38
Ninnescah	92	27	57.8	2.60
Riley, Fort	90	30	.....	1.60
Salina*	71	38	55.2	1.06
Tribune	92	30	53.4	4.37
Wakefield*	90	36	58.8	3.53
Wellington	85	32	59.3	0.49
Wilson	88	24	56.2	0.86
Yates Centre	87	32	57.6	4.50
Kentucky.				
Bowling Green*	.....	.....	61.2	2.45
Carlisle	85	26	53.8	4.16
Frankfort	88	27	55.7	3.68
Shelbyville	92	36	59.1	4.48
Louisiana.				
Grand Coteau	85	51	70.6	2.68
Liberty Hill	90	42	83.0	1.95
Luling	85	52	.....	2.40
Port Eads	85	56	.....	0.40
Maine.				
Bar Harbor	64	13	.....	3.00
Cornish	73	15	37.4	2.75
Gardiner	79	15	38.2	2.27
Orono	76	13	37.5	1.78
Kent's Hill	62	9	36.2	1.74
Maryland.				
Cumberland	86	26	50.3	2.56
Great Falls*	88	32	53.1	1.56
McDonogh	85	32	50.6	2.03
McHenry, Fort	82	32	51.3	0.89
Mount St. Mary's	86	32	50.9	1.99
Woodstock	89	27	51.0	1.96
Massachusetts.				
Amherst *a*	84	15	40.4	3.08
Amherst *b*	84	17	42.9	3.32
Blue Hill Observ'y	77	17	39.7	2.07
Deerfield	86	14	40.7	3.33
Dudley	84	17	41.4	2.40
Fall River	70	22	41.1	2.75
Fitchburg	77	21	40.1	3.58
Heath	.....	.....	43.6	.....
Milton	70	27	38.5	1.86
New Bedford	66	20	41.7	2.43
Newburyport	77	18	41.1	3.54
Provincetown	66	24	42.0	1.86
Somerset	81	18	44.0	2.17
Taunton	80	20	42.2	2.35
Westborough*	85	18	43.1	2.27
Worcester	82	20	39.5	3.23
Mexico.				
Leon de Aldamas	86	51	69.6	1.04
Michigan.				
Alma	66	31	41.0	1.87
Birmingham	84	18	43.1	1.73
Bensonia	78	12	37.2	2.63
Brady, Fort	68	— 7	.....	1.60
Buchanan	79	26	46.1	1.92
Corunna	81	18	43.7	2.30
Harrisville	80	11	37.0	1.83

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation.
Michigan—Con'd.	°	°	°	*Inches*
Hart	69	29	42.1	3.66
Hudson	82	19	.....	1.44
Chelsea	84	18	43.9	1.34
Kalamazoo *a*	80	26	45.7	1.07
Concord	83	22	45.3	0.93
Lansing	80	21	44.3	1.29
Maple Hill	78	2	35.5	2.03
Madison	86	27	43.3	1.89
Mottville*	84	21	45.0	2.43
Ovid	81	21	42.9	1.64
Coldwater	82	24	46.4	1.48
Thornville*	85	22	42.3	1.57
Pulaski	83	26	45.8	1.47
Traverse City	88	9	.....	3.26
Pontiac	78	22	43.6	1.36
Mio	85	9	39.6	2.67
Olivet	80	27	45.6	1.43
Minnesota.				
Minneapolis	74	25	40.2	5.12
Snelling, Fort	78	17	41.1	0.79
Mississippi.				
Biloxi	81	51	69.7	1.78
Palo Alto	86	44	68.9	.....
Missouri.				
Conception	84	23	53.8	.....
Fayette	89	29	58.2	1.32
Oregon	90	27	55.7	1.95
Warrenton	84	43	63.0	.....
Montana.				
Keogh, Fort	87	26	.....	0.15
Missoula, Fort	78	30	.....	.....
Shaw, Fort	80	12	49.5	.....
Virginia City	75	17	46.0	.....
Nebraska.				
Culbertson	96	22	56.5	2.90
De Soto*	86	24	52.4	3.93
Falls City	84	30	55.7	1.79
Fairbury	85	30	.....	1.85
Fremont*	84	25	52.0	1.97
Genoa	89	28	51.4	3.58
Hay Springs	85	23	47.7	0.88
Kimball	85	21	.....	0.47
Lincoln	87	27	53.8	1.61
Marquette	89	26	.....	2.02
Niobrara, Fort	94	23	51.9	0.96
North Loup	62	32	52.1	.....
Robinson, Fort	.....	16	52.8	0.04
Sidney, Fort	89	26	.....	1.35
Syracuse	84	37	54.3	2.00
Weeping Water	80	17	49.4	2.12
Nevada.				
Carson City	86	19	53.3	0.20
McDermit, Fort	84	23	54.2	T.
New Hampshire.				
Antrim	.....	.....	.....	3.23
Ashland	.....	.....	.....	3.38
Belmont	.....	.....	.....	2.86
Bristol	.....	.....	.....	3.64
Concord	86	15	41.1	2.84
Lake Village	.....	.....	.....	3.15
Nashua	83	18	40.5	3.25
Wier's Bridge	.....	.....	.....	3.39
Wolfeborough	.....	.....	.....	3.21
New Jersey.				
Beverly	88	30	49.0	1.89
Clayton*	90	30	48.7	2.23
Egg Harbor City	86	26	46.8	3.37
Moorestown	89	30	48.0	2.02
Readington*	88	30	49.2	.....
South Orange	86	26	46.2	4.10
Vineland	84	29	51.7	2.00
New Mexico.				
Bayard, Fort	80	39	59.2	.....
Gallinas Spring	80	39	58.7	.....
Las Vegas	79	32	51.3	0.76
Selden, Fort	90	40	66.2	0.54
Union, Fort	74	28	50.5	2.16
New York.				
Ardenia	86	31	43.0	2.71
Auburn	79	23	43.1	4.11
Boyd's Corners	80	28	.....	2.68
Brooklyn	77	31	47.5	3.60
Columbus, Fort	78	29	46.5	3.43
Cooperstown	80	18	37.7	3.05
Eden	84	23	.....	.....
Factoryville	85	21	42.4	2.02
Geneva	.....	.....	39.2	3.40
Humphrey	80	23	39.3	4.14
Ithaca	82	20	41.3	2.15
Le Roy	84	19	40.6	2.21
Madison Barracks	69	17	.....	0.66
Menands	86	28	43.4	2.03
Niagara, Fort	82	22	39.4	.....
North Volney	77	25	38.6	.....
Palermo*	76	16	38.2	2.30
Plattsburg B'ks	79	6	37.5	1.27
Palmyra	85	29	.....	.....
Pen Yan	.....	.....	.....	2.75
Rose	79	25	40.0	2.87
Setauket	81	29	44.7	2.58
Utica	83	17	37.7	3.87
West Point	.....	.....	.....	2.68
White Plains	83	22	47.4	.....
North Carolina.				
Chapel Hill	94	34	60.4	1.10
Statesville*	89	35	59.6	2.52
Tarborough	92	34	59.9	1.77
Weldon*	91	32	56.5	1.18
Ohio.				
Bellville	84	30	.....	.....
Cleveland	79	26	45.5	2.41
College Hill*	85	41	55.9	3.50

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation.
Ohio—Cont'd.	°	°	°	*Inches*
Elyria	86	25	55.5	2.10
Garrettsville	84	16	43.8	2.24
Jacksonborough	88	30	51.8	1.90
Lordstown	84	20	45.8	1.66
Napoleon	85	29	48.4	1.19
New Athens	85	23	.....	.....
North Lewisburg	87	28	62.9	2.50
Portsmouth	86	31	53.7	2.32
Ruggles*	82	32	45.8	2.25
Tiffin*	83	31	47.5	2.20
Wauseon	86	23	46.3	2.27
Westerville	84	27	49.3	1.84
West Milton	90	30	56.0	7.00?
Yellow Springs	82	28	50.7	1.87
Youngstown	.....	.....	.....	1.58
Oregon.				
Albany	81	30	55.4	1.40
Bandon*	67	34	49.6	1.38
East Portland*	84	30	.....	1.06
Eola	77	40	52.7	0.89
La Grande	81	29	.....	1.02
Klamath, Fort	82	16	47.6	0.48
McMinnville	79	29	51.4	1.56
Yaquina Lt. House	69	37	48.2	2.50
Pennsylvania.				
Altoona	84	25	50.4	2.34
Catawissa	90	26	52.0	2.91
Corry*	84	18	41.9	3.30
Drifton	87	20	42.6	2.68
Dyberry	84	17	40.3	2.96
Easton	.....	.....	.....	3.96
Franklin*	.....	.....	45.3	2.38
Germantown	90	30	.....	2.56
Grampian Hills	84	16	43.1	2.27
Indiana	.....	.....	47.6	.....
Meadville	80	38	51.9?	.....
Phillipsburg	86	19	41.0	1.31
Quakertown	87	26	46.1	4.23
Reading	93	33	49.5	3.62
State College	84	28	46.9	2.79
Troy	88	22	44.1	1.90
West Chester	86	28	48.0	2.48
Wilkes-Barre	84	24	42.1	2.49
South Carolina.				
Aiken	85	43	67.1	1.60
Blacks	90	38	.....	.....
Cedar Springs	91	31	62.6	1.40
Kirkwood	79	43	60.2	1.26
Stateburg*	87	42	64.4	0.83
Tennessee.				
Ashwood	82	38	56.0	3.72
Milan	87	36	63.3	2.45
Texas.				
Cedar Hill	94	50	72.0	9.00
Cleburne*	89	38	66.2	5.15
Comanche	94	42	.....	7.18
Concho, Fort	85	43	.....	3.63
Corsicana	.....	.....	.....	3.75
Gallinas	86	49	69.8	5.21
Decatur	92	40	66.9	3.13
Lampasas	88	43	67.1	4.61
McIntosh, Fort	91	50	73.7	5.78
Mesquite	94	39	.....	2.29
New Ulm	87	50	70.9	3.76
Ringgold, Fort	97	55	75.9	3.78
Silver Falls	90	38	63.3	4.45
Vermont.				
Burlington	80	16	42.6	1.93
Brattleborough	86	13	42.7	3.96
Lunenburg	72	0	33.8	0.90
Manchester	82	17	39.6	4.04
Middlebury	78	18	.....	1.45
Strafford*	72	16	37.9	3.00
St. Johnsbury	75	2	35.2	0.80
Virginia.				
Bird's Nest*	87	36	52.5	4.10
Dale Enterprise*	89	26	53.8	1.44
Marion	82	27	52.0	1.90
Monroe, Fort	88	36	.....	0.93
Summit*	87	28	51.6	.....
University of Va	72	34	53.2	1.79
Variety Mills	86	26	53.1	2.21
Wytheville	81	26	54.3	1.35
Washington Territory				
Blakely	72	32	51.7	1.96
Spokane, Fort	83	26	.....	1.00
Tacoma	68	39	51.0	1.47
Townsend, Fort	64	36	50.2	1.69
Vashon	80	30	51.0	1.34
Walla Walla, Fort	88	33	58.2	0.54
West Virginia.				
Clarksburg*	81	22	52.0	2.44
Helvetia*	82	22	48.1	2.61
Hartmonsville	79	24	.....	.....
Middlebrook*	75	20	44.1	.....
Parkersburg	86	28	52.2	2.55
Wisconsin.				
Beloit	82	27	44.6	2.76
Delavan	87	23	43.6	2.41
Embarras*	82	22	39.9	3.25
Fond du Lac	83	22	40.4	1.81
Fredonia	88	28	44.3	.....
Lancaster	80	24	45.6	3.05
Manitowoc	72	22	40.1	2.23
Madison	78	27	45.4	1.85
Prairie du Chien	79	31	46.4	3.38
Waucousta	62	22	.....	.....
Wyoming.				
Camp Sheridan	72	22	41.8	4.80?
Laramie, Fort	85	24	.....	0.12
McKinney, Fort	75	24	49.1	1.33
Washakie, Fort	80	22	.....	0.51

Form 106 C 1884

Chart I. Tracks of Areas of L



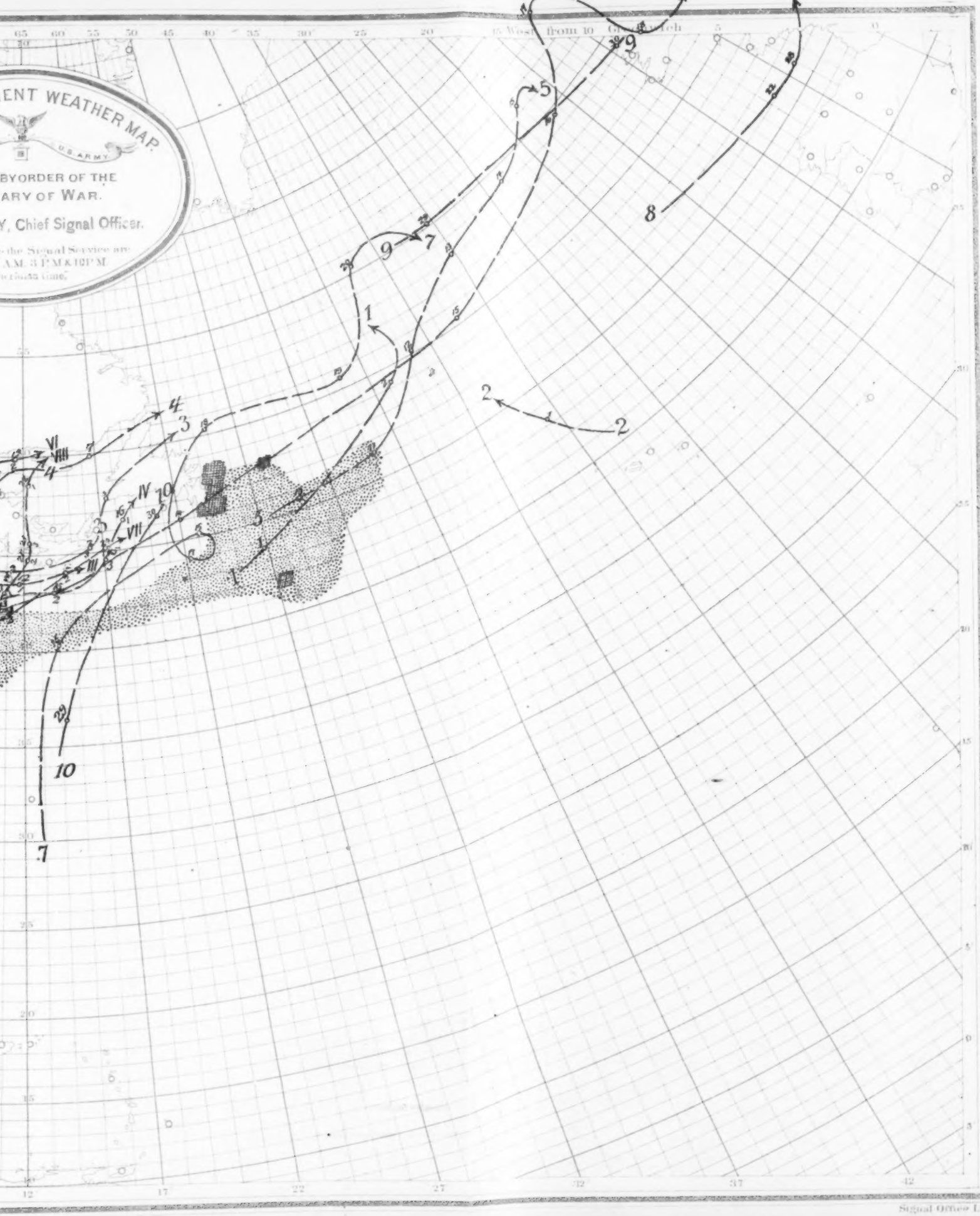
NOTES.

The Roman letters show number and order of areas of low pressure. The figures above the lines show the days of the month, those below (1, 2, and 3) indicate, respectively, the 7 a. m., 3 and 10 p. m., 75th meridian time, observations.

The dotted shading ( ) indicates fog belts.

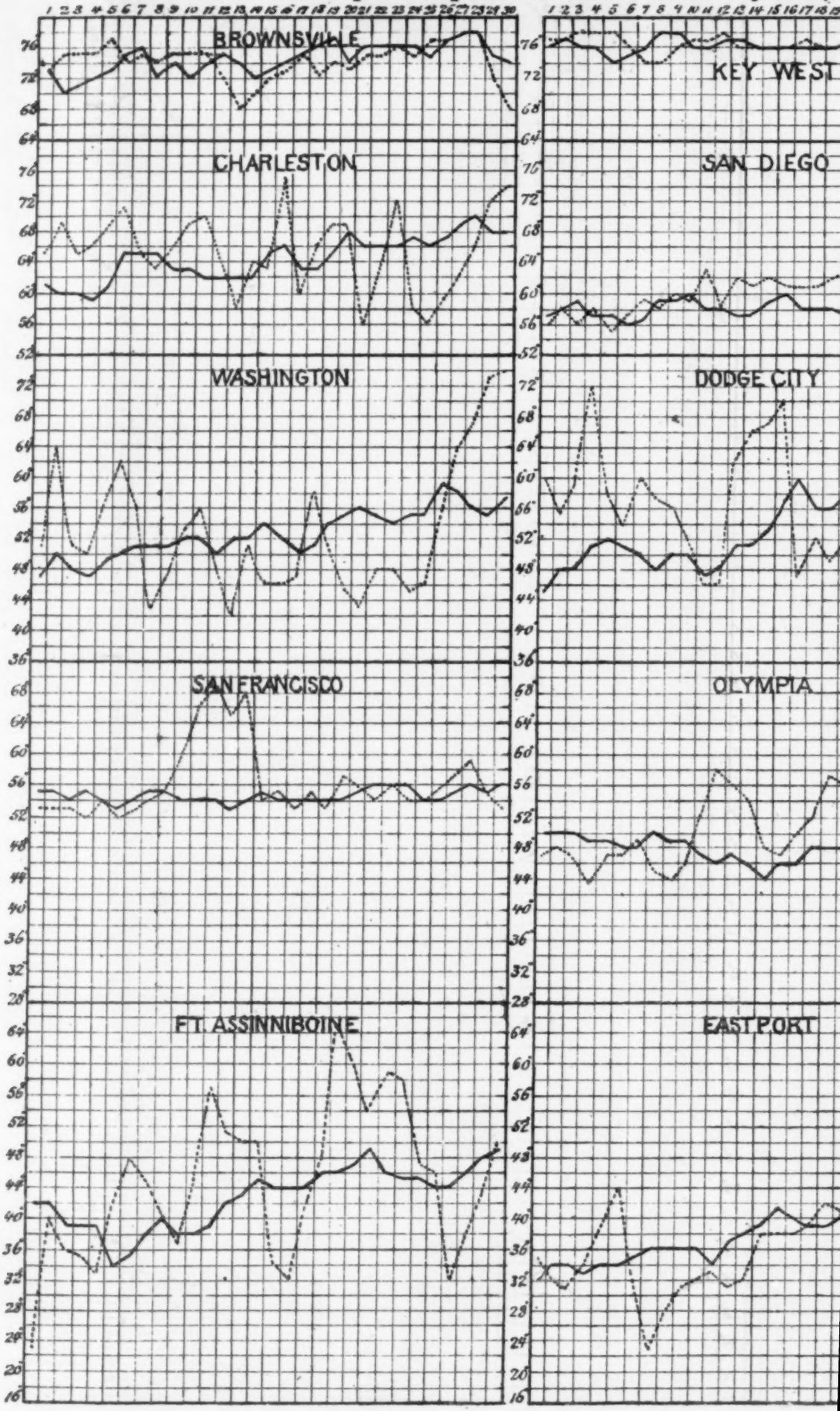
The ruled shading ( ) indicates the position in which icebergs and field-ice were observed.

of Low Pressure. April, 1888.



Signal Office Lith

Chart III. Normal April Temperatures for a number of years (—



ars (———). Mean Temperatures for April, 1888, (·····).

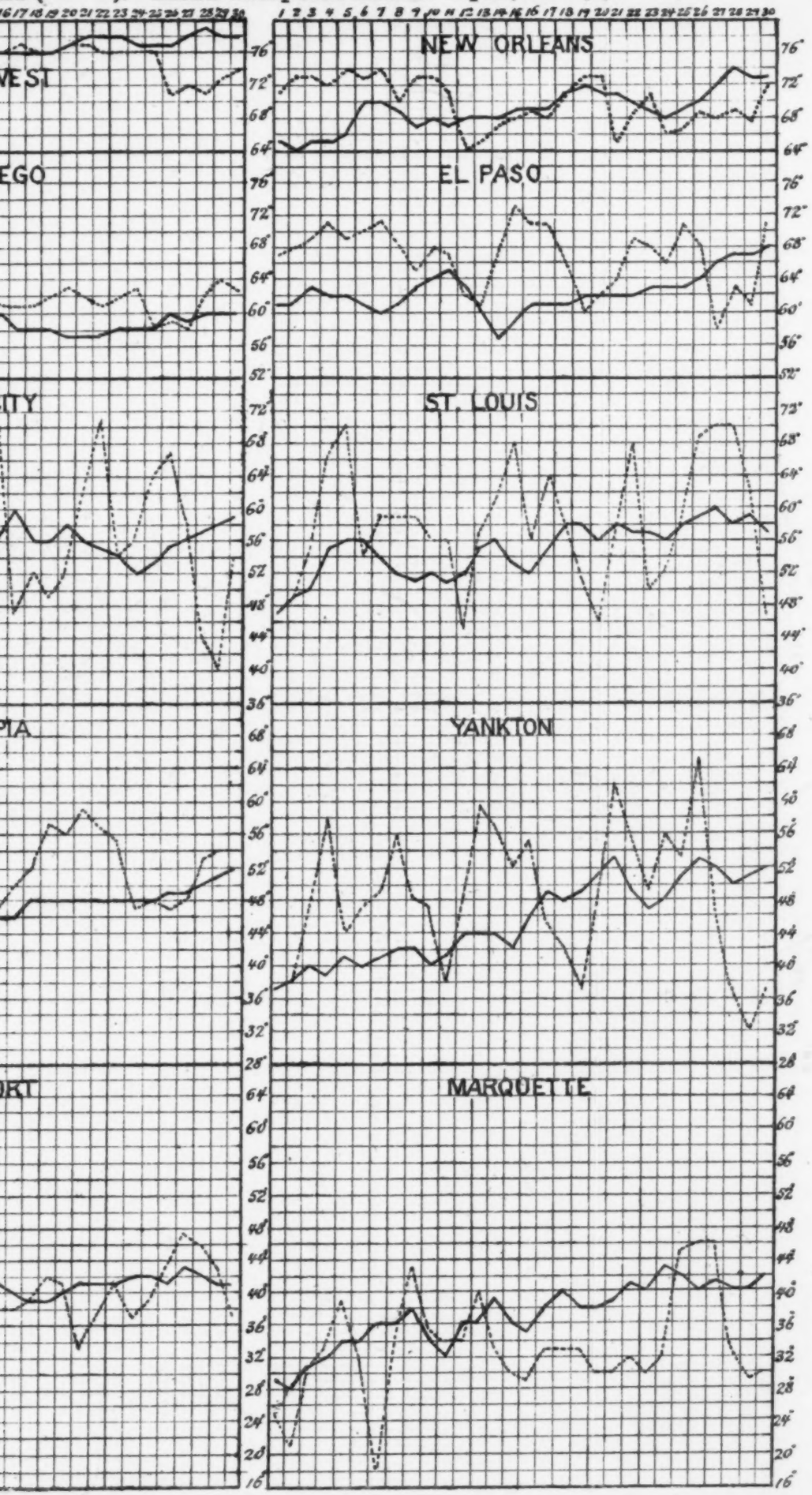


Chart II. Isobars, Isotherms, and Winds, April, 1888

Chart II. Isobars, Isotherms, and Winds. April, 1888

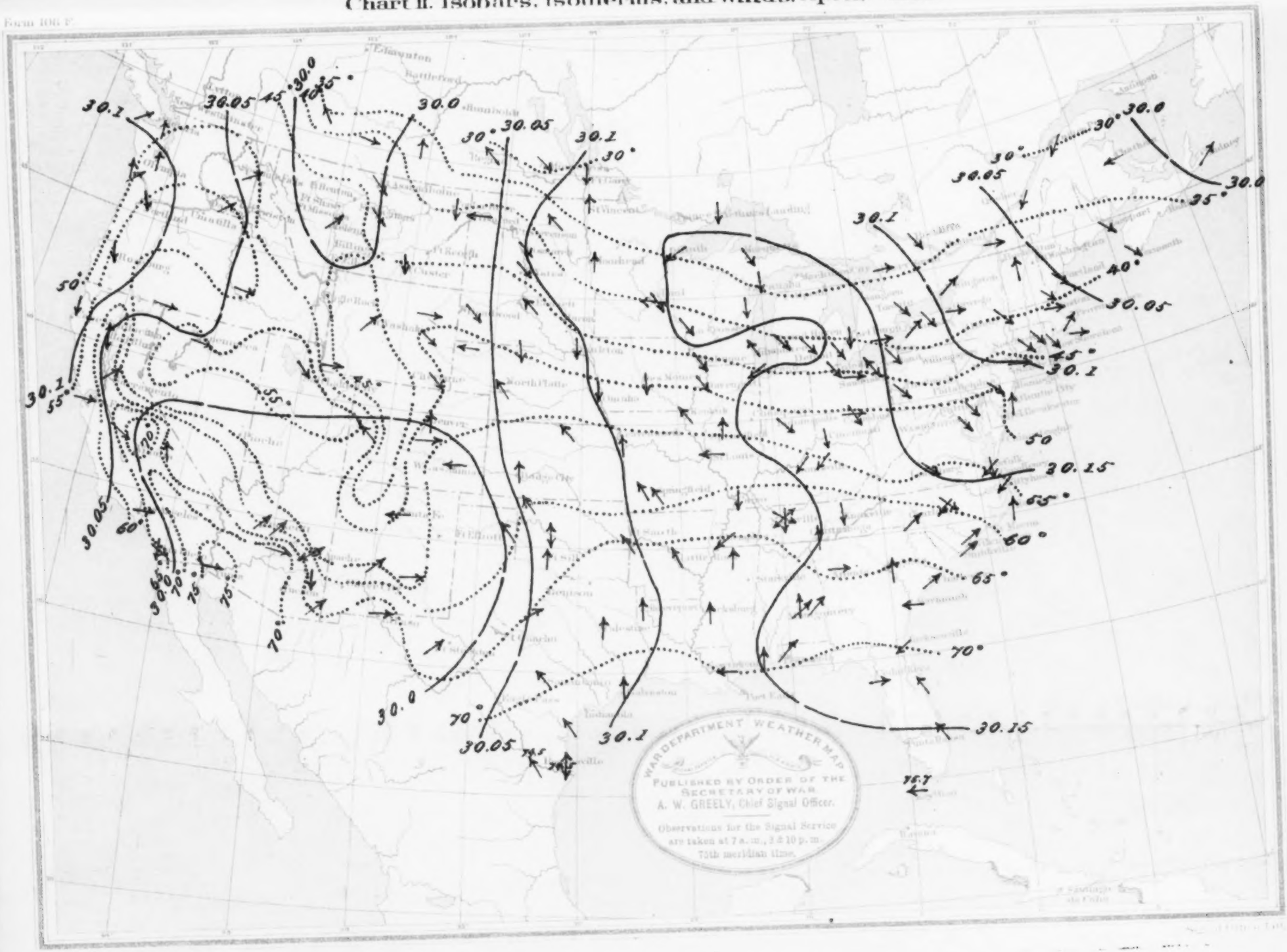
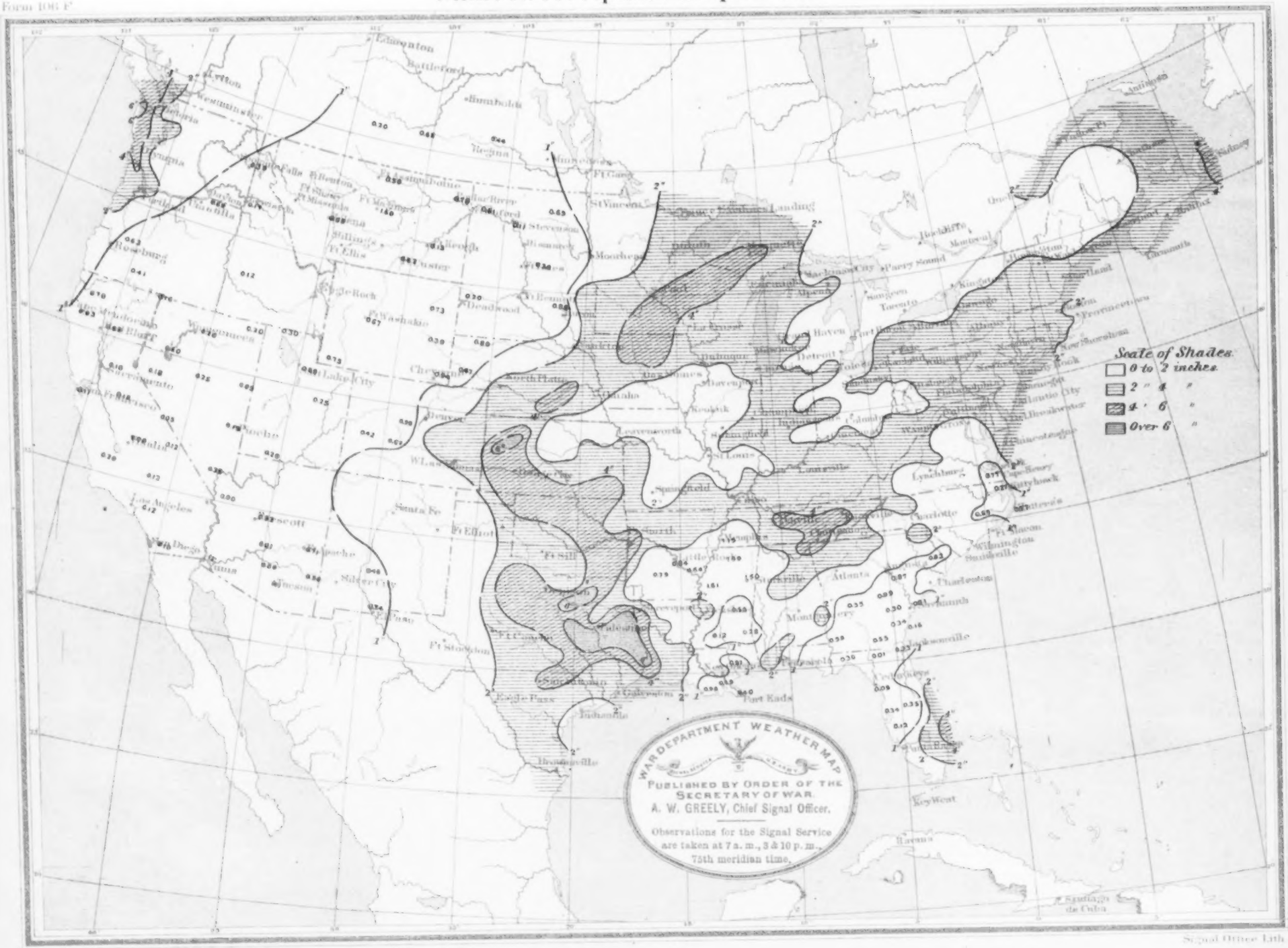

WAR DEPARTMENT WEATHER MAP
PUBLISHED BY ORDER OF THE SECRETARY OF WAR
A. W. GREELY, Chief Signal Officer.
Observations for the Signal Service are taken at 7 a. m., 3 & 10 p. m. 75th meridian time.

Chart IV. Precipitation, April, 1883

Form 1065 F

Chart IV. Precipitation, April, 1888


Scale of Shades.
0 to 2 inches.
2 " 4 "
4 " 6 "
Over 6 "
WAR DEPARTMENT WEATHER MAP
PUBLISHED BY ORDER OF THE SECRETARY OF WAR.
A. W. GREELY, Chief Signal Officer.
Observations for the Signal Service are taken at 7 a. m., 3 & 10 p. m., 75th meridian time.

Signal Office Lith

List of voluntary stations of the Signal Service, with their respective observers, from which meteorological reports were received in time to be used in the preparation of the Monthly Weather Review for April, 1888.

Place of observation and observer.

Alabama.

Livingston, J. W. A. Wright.
New Market, Dr. Geo. D. Norris.

Arizona.

Cedar Springs, J. E. Norton.
Eagle Pass, R. B. Tripp.
Tucson, Edward L. Wetmore.

Arkansas.

Eureka Springs, A. H. Foote.
Lead Hill, Silas C. Turnbo.

California.

Banning, Welwood Murray.
Georgetown, C. M. Fitzgerald.
Hydesville, E. T. Foss.
Lewis Creek, John Touhy.
Nicolaus, Alvah Pendleton.
Oakland, Dr. J. B. Trembley.
Oroville, Hiram Arents.
Riverside, A. K. Holt.
Salinas, Dr. E. K. Abbott.
Sacramento, S. H. Gerrish.
Santa Barbara, H. D. Vail.
Santa Maria, L. E. Blochman.
Willows, David Bentley.

Colorado.

Bennett, I. S. Putnam.
Fort Collins, Prof. V. E. Stolbrand.
Georgetown, W. A. Jayne, M. D.
Grand Junction, Frank McClintock.

Connecticut.

Hartford, Wm. R. Matson.
New Hartford, Wm. Goodwin.
Southington, Luman Andrews.
Voluntown, Rev. E. Dewhurst.

Dakota.

Davenport, J. W. Leech.
Gallatin, J. S. Pound.
Garden City, W. C. T. Newell.
Goddard, Mrs. M. F. Goddard.
Kimball, A. S. Stuver.
Parkston, John J. Swartz.
Webster, Arthur Betts.
Woonsocket, L. O. Libbey.

District of Columbia.

Kendall Green, Deaf and Dumb Institute.
Receiving Reservoir, Distributing Reservoir, Rock Creek Bridge } Washington Aqueduct.

Florida.

Archer, Dr. J. C. Neal.
Duke, B. P. Ferrill.
Fort Meade, A. H. Adams.
Homeland, J. S. Wade.
Limona, J. G. Knapp.
Manatee, Mrs. Mary W. Broberg.
Merritt's Island, Rev. J. H. White.
Nama, Chas. E. Robbins.
Tallahassee, Rev. Dr. W. H., Carter.

Georgia.

Athens, Prof. L. H. Charbonnier.
Forsyth, Thos. G. Scott.
Milledgeville, S. A. Cook.
Quitman, J. L. Cutler.

Idaho.

Lewiston, Robert Schleicher.

Illinois.

[illegible] J. B. Dazey.
[illegible]e, P. J. Hasenstab.
[illegible]ohn S. Seely.
[illegible] John E. Templeton.
[illegible]v. J. E. Terborg.
[illegible]n W. James.
[illegible] T. D. Robertson.
[illegible] Roswell Dow.
[illegible] Dr. N. E. Ballou.
[illegible]nston, Dr. M. D. Ewell.
[illegible]. H. Hatch.

Indiana.

[illegible] C. F. Hole.
[illegible]lle, J. C. Loomis.
[illegible]afe Crozier.
[illegible]. R. H. Rerrick.
[illegible]t, Thos. B. Helm.
[illegible]wood Kirkwood.
[illegible] B. F. Ferris.
[illegible]y, Prof. Chas. Boerner.

Iowa.

Albion, Enoch Lewis.
Amana, Conrad Schadt.
Ames, J. Rush Lincoln.
Auburn, Edwin Miller.
Bancroft, H. N. Renfrew.
Cedar Rapids, H. D. Olds.
Clarinda, A. S. Van Sandt.
Clear Lake, Dr. J. C. Wright.
Clinton, Luke Roberts.
Cresco, Gregory Marshall.
Cromwell, E. E. Harrison.

Place of observation and observer.

Iowa—Con.

Denmark, G. B. Brackett.
Des Moines, Adolphus Voegeli.
Dysart, Jos. Dysart.
Elkader, J. N. Hamilton.
Fort Madison, Miss L. A. McCready.
Glenwood, Seth Dean.
Glenwood, A. Schappel.
Hampton, E. C. Grenelle.
Humboldt, Miss. Florence Prouty.
Independence Emil F. Wülfke.
Iowa City, Prof. A. A. Veblen.
Logan, Jacob T. Stern.
Manson, W. L. Thompson.
Maquoketa, A. B. Bowers.
Monticello, H. D. Smith.
Mount Vernon, Prof. Alonzo Collin.
Osage, G. D. Pettingill.
Osceola, F. M. Kyte.
Oskaloosa, Joseph Boyd
Oskaloosa, O. H. Avey.
Sac City, Dr. Caleb Brown.
Sac City, Sidney Smith.
Smithland, Dr. Chas. Rice.
Vinton, T. F. McCune.
Washington, Wm. A. Cook.
Wesley, Wm. Ward.
West Bend, J. H. Warren.

Kansas.

Allison, John J. Cass.
East Norway, P. L. Gray.
Elk Falls, Dr. A. C. Williams.
Emporia, Prof. J. H. Dinsmore, jr.
El Dorado, H. C. Ford.
Globe, Wm. Featherston.
Independence, J. M. Altaffer.
Lawrence, Prof. F. H. Snow.
Lebo, C. W. Burnet.
Manhattan, C. P. Blachley.
Morse, R. P. Edgington.
Ninnescah, E. Shaw.
Salina, J. H. Gibson.
Scott, L. C. Vickrey.
Tribune, S. B. Jackson.
Wakefield, Wm. P. Cochran
Wellington, John H. Wolfe.
Wilson, E. Y. Dollenmayer.
Yates Centre, F. R. Gray.

Kentucky.

Bowling Green, M. H. Crump.
Carlisle, W. H. Fritts.
Elkin, Chas. Ogden.
Frankfort, E. C. Went.
Shelbyville, W. H. Stuart.

Louisiana.

Grand Coteau, Rev. C. M. Widman, S. J.
Liberty Hill, E. A. Crawford.
Luling, F. M. Rogers.
Port Eads, Mrs. C. L. Kleinpeter.

Maine.

Bar Harbor, Joseph Wood.
Cornish, Silas West.
Gardiner, Rev. Charles L. Wells.
Kent's Hill, W. C. Strong.
Orono, Prof. M. C. Fernald.

Maryland.

Barron Creek Sp'gs, Albert E. Acworth
Cumberland, E. T. Shriver.
Great Falls, Washington Aqueduct.
McDonogh, McDonogh Institute.
Mount St. Mary's, M't St. Mary's College
Woodstock, Woodstock College.

Massachusetts.

Amherst, Miss S. C. Snell.
Amherst, Massachusetts Agricultural Experimental Station.
Blue Hill, Rev. A. K. Teele.
Blue Hill Observatory, A. L. Rotch.
Cambridge, Harvard College Observatory.
Dudley, Conant Observatory.
Deerfield, Rev. A. Hazen.
Fall River, C. V. S. Remington.
Heath, B. B. Cutler.
Marion, J. E. Hadley.
New Bedford, Thomas R. Rodman.
Newburyport, T. V. Pike.
Provincetown, John R. Smith.
Somerset, Elisha Slade.
Taunton, Dr. E. U. Jones.
Westborough, G. S. Newcomb.
Worcester, J. B. Hall.

Michigan.

Hudson, Major A. H. Boies.
Kalamazoo, W. A. Black.
Lansing, Dr. H. B. Baker.
Marshall, W. T. Drake.
Mottville, J. A. Hartzler.
Thornville, J. S. Caulkins.
Traverse City, S. E. Wait.

Place of observation and observer.

Minnesota.

Minneapolis, Wm. Cheney.

Mississippi.

Biloxi, Dr. R. G. Hinsdale.
Palo Alto, W. H. Hill.

Missouri.

Conception, Rev. M. Eckstein.
Fayette, Prof. T. Berry Smith.
Frankford, W. W. Vermillion.
Pierce City, J. J. Spilman.
Warrenton, Prof. J. H. Frick.

Montana.

Virginia City, Eugene Stark.

Nebraska.

Culbertson, G. D. Carrington.
De Soto, Chas. Seltz.
Fairbury, Dr. J. Humphrey.
Fremont, Rev. L. F. Berry.
Genoa, Geo. S. Truman.
Hay Springs, Wm. Waterman.
Kimball, Wm. G. Barton.
Lincoln, University of Nebraska.
Marquette, John Ellis.
Syracuse, P. W. Risser.
Tecumseh, W. L. Dunlap.
Weeping Water, G. Treat.

Nevada.

Carson City, Chas. W. Friend.

New Hampshire.

Antrim, Frank W. Palmer.
Berlin Mills, Q. A. Bridges.
Concord, W. L. Foster.
Nashua, Chas. H. Webster.
Ashland, Belmont, Bristol, Lake Village, Weir's Bridge, Wolfeborough, } Lake Winipiseogee Cotton and Woolen Manufacturing Co.

New Jersey.

Beverly, C. F. Richardson.
Clayton, W. T. Wilson.
Egg Harbor City, H. Y. Postma.
Moorestown, Thos. J. Beans.
Readington, John Fleming.
South Orange, Dr. W. J. Chandler.
Vineland, Dr. O. H. Adams.

New Mexico.

Gallinas Spring, J. E. Whitmore.
Las Vegas, F. W. Chatfield.

New York.

Ardenia, Richard B. Arden.
Auburn, Geo. Casey.
Boyd's Corners, Thomas Manning.
Brooklyn, Prof. W. C. Peckham.
Cooperstown, G. Pomeroy Keese.
Eden, W. P. Hunt.
Factoryville, T. P. Yates.
Geneva, Mrs. C. K. M. Yates.
Humphrey, Chas. E. Whitney.
Ithaca, Cornell University.
LeRoy, Prof. F. M. Comstock.
Menands, C. B. Tillinghast.
North Volney, J. M. Patrick.
Palmyra, L. D. Cummings.
Penn Yan, Geo. R. Young.
Rose, George Smart.
Setauket, Selah B. Strong.
Syracuse, J. F. Boynton.
Utica, Thomas Birt.
Vermillion, E. B. Bartlett.
White Plains, Prof. O. R. Willis.

North Carolina.

Chapel Hill, Prof. J. W. Gore.
Hot Springs, Dr. C. F. McGahan.
Lenoir, Dr. R. L. Beall.
Raleigh, Thos. C. Harris.
Statesville, W. A. Eliason.
Tarborough, E. V. Zreller.
Weldon, T. A. Clark.

Ohio.

Bellevue, Wm. Sheffield.
Cleveland, G. A. Hyde.
College Hill, John W. Hammitt.
Elyria, C. W. Goodspeed.
Garrettsville, S. M. Luther.
Jacksonborough, Dr. J. B. Owsley.
Lordstown, W. S. Dean.
Napoleon, Dr. T. C. Hunter.
New Athens, T. M. Sewell.
North Lewisburg, H. D. Gowey.
Portsmouth, Dr. D. B. Cotton.
Ruggles, Peter Bowman.
Tiffin, Rev. T. H. Sonedecker.
Wauseon, Thos. Mikesell.
Westerville, Prof. John Haywood.
West Milton, Luke S. Motte.
Yellow Springs, Chas. W. Rice.
Youngstown, A. G. Frost.

Place of observation and observer.

Oregon.

Albany, John Briggs.
Bandon, Geo. Bennett.
East Portland, Dr. Geo. Wigg.
Eola, Thos. Pearce.
La Grande, J. K. Romig.
McMinnville, Prof. W. J. Crawford.
Yaquina L. H, Dr. John G. Jessup.

Pennsylvania.

Altoona, Chas. B. Dudley, M. D.
Catawissa, Robt. M. Graham.
Corry, Wm. Loveland.
Drifton, H. D. Miller.
Dyberry, Theo. Day.
Easton, Dr. J. W. Moore.
Franklin, Joseph Bell.
Germantown, Thomas Meehan.
Grampian Hills, Nathan Moore.
Indiana, McLean W. Davis.
Meadville, David Logan.
Phillipsburg, L. Ray Morgan.
Quakertown, J. L. Heacock.
Reading, C. M. Dechant.
State College, Agricultural Experimental Station, State College.
Troy, M. Gustin.
Wellsborough, Hiram D. Deming.
West Chester, Dr. Jesse C. Green.

South Carolina.

Aiken, Dr. W. H. Geddings.
Black's, Jos. Black.
Cedar Springs, J. T. Bayerly.
Kirkwood, Colin Macrae.
Stateburg, Dr. W. W. Anderson.

Tennessee.

Ashwood, Rev. C. F., Williams.
Austin, P. B. Calhoun.
Milan, Dr. M. D. L. Jordan.

Texas.

Austin, Oscar Samostz.
Cedar Hill, J. P. Berry.
Cleburne, Dr. T. C. Osborn.
Colorado, Fred R. Blount.
Comanche, E. N. Wiesendanger.
Corsicana, W. H. Hamilton.
Decatur, H. D. Donald.
Gallinas, Lum Woodruff.
Lampasas, Dr. C. M. Ramsdell.
Mesquite, Silas G. Lackey.
Midland, J. C. Rathburn.
New Ulm, C. Runge.
Silver Falls, C. M. Tilford.

Vermont.

Brattleborough, W. H. Childs.
Burlington, W. B. Gates.
Lunenburg, Dr. Hiram A. Cutting.
Manchester, Rev. E. P. Wild.
Middleburg, S. Holton.
Saint Johnsbury, F. Fairbanks.
Strafford, H. F. J. Scribner.

Virginia.

Bird's Nest, C. R. Moore.
Christianburg, H. D. Walters.
Dale Enterprise, L. J. Heatwole.
Marion, A. T. Lincoln.
Rappahannock, W. H. Ireland.
Summit, J. R. Sim.
University of Va., James Wearmouth.
Variety Mills, J. H. Micklem.
Wytheville, Howard Shriver.

Washington Territory.

Blakeley, R. M. Hoskinson.
Tacoma, E. N. Fuller.
Vashon, Ferd. A. Carpenter.

West Virginia.

Clarksburg, R. T. Lowndes.
Hartmonsville, W. C. Tobb.
Helvetia, Dr. C. T. Stucky.
Middlebrook, S. F. H. Hewit.
Parkersburg, T. G. Field.

Wisconsin.

Beloit, Beloit College Observatory.
Delavan, George L. Collie.
Deuster, G. H. Kruschke.
Embarras, J. E. Breed.
Fond du Lac, J. C. Wedge.
Fredonia, B. H. Meyer.
Lancaster, Edward Pollock.
Madison, Washburn Observatory.
Manitowoc, Miss Clasina Lüps.
Prairie du Chien, College of the Scared Heart.
Waucousta, G. H. Yapp.

Foreign.

Grand Turk, W. Indies, Geo. I. Gibbs.
Leon, Mexico, Prof. M. Leal.
Montreal, C. H. McLeod.
New Westminster, B.C., Capt. Adolphus Peele,
Port-au-Prince, Hayti, Prof. P. Scherer.

Military posts from which meteorological reports were received, through the Surgeon General of the Army, in time to be used in the preparation of the Monthly Weather Review for April, 1888.

Alabama.
Mount Vernon B'ks.

Arizona.
Huachuca, Fort.
Mojave, Fort.

Arkansas.
Hot Springs.

California.
Alcatraz Island.
Bidwell, Fort.
Mason, Fort.
Presidio of San F.

Colorado.
Lewis, Fort.

Dakota.
A. Lincoln, Fort.
Meade [illegible].
Pembina, Fort.
Randall, Fort.
Sisseton, Fort.
Sully, Fort.
Totten, Fort.
Yates, Fort.

Florida.
Staint Francis B'ks.

Idaho.
Boisé Barracks.
Sherman, Fort.

Indian Territory.
Gibson, Fort.
Reno, Fort.
Supply, Fort.

Kansas.
Hays, Fort.
Riley, Fort.

Maryland.
McHenry, Fort.

Michigan.
Brady, Fort.

Minnesota.
Snelling, Fort.

Montana.
Keogh, Fort.
Missoula, Fort.
Shaw, Fort.

Nebraska.
Niobrara, Fort.
Robinson, Fort.
Sidney, Fort.

Nevada.
McDermit, Fort.

New Mexico.
Selden, Fort.
Union, Fort.
Wingate, Fort.

New York.
Columbus, Fort.
Madison Barracks.
Niagara, Fort.
Plattsburg Barracks.
West Point.

Oregon.
Klamath, Fort.

Texas.
Concho, Fort.
McIntosh, Fort.

Texas.—Con.
Ringgold, Fort.

Virginia.
Monroe, Fort.

Washington Ter.
Townsend, Fort.
Walla Walla, Fort.

Wyoming.
Laramie, Fort.
McKinney, Fort.
Sheridan, Camp.
Washakie, Fort.

State weather services from which meteorological reports were received in time to be used in the preparation of the Monthly Weather Review for April, 1888.

Alabama, P. H. Mell, jr., Signal Corps, director, Auburn, Ala.
Arkansas, Prof. John C. Branner, director, Little Rock, Ark.
Colorado, Prof. F. H. Loud, director, Colorado Springs, Colo.
Illinois, Col. Charles F. Mills, director, Springfield, Ill.
Indiana, Prof. H. A. Huston, director, Lafayette, Ind.
Kansas, Prof. J. T. Lovewell, director, Topeka, Kans.
Louisiana, R. E. Kerkam, Sgt., Signal Corps, director, New Orleans, La.
Michigan, N. B. Conger, Sgt., Signal Corps, director, Lansing, Mich.
Minnesota, Prof. W. W. Payne, director, Northfield, Minn.
Mississippi, Prof. R. B. Fulton, director, University, Miss.
Missouri, Prof. F. E. Nipher, director, Saint Louis, Mo.
Nebraska, Prof. G. D. Swezey, director, Crete, Nebr.
Nevada, Prof. Chas. W. Friend, director, Carson City, Nev.
New England, Prof. W. H. Niles, President, Boston, Mass.
New Jersey, Prof. George H. Cook, director, New Brunswick, N. J.
North Carolina, Dr. Herbert Battle, director, Raleigh, N. C.
Ohio, Prof. Benj. F. Thomas, director, Ohio State University, Columbus, Ohio.
Oregon, B. S. Pague, Sgt., Signal Corps, Roseburg, Oregon.
Pennsylvania, under direction of Franklin Institute, Philadelphia, Pa.
South Carolina, Hon. A. P. Butler, director, Columbia, S. C.
Tennessee, J. D. Plunket, M. D., director; H. C. Bate, assistant, Nashville, Tenn.

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